Proceedings of the
American Association of Textile Chemists and Colorists

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Editor of Proceedings: Carl Z Draves, 30 Lahey St, New Hyde Park, N Y

AUGUST 17, 1953

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Research Newsletter

NEWS IN GENERAL

A summer session of the Executive Committee on Research was held in New York City on August 4th. Reports were heard from Dr Stiegler on research activities; from Charles Dorn, Chairman of the Technical Committee on Research; from William Appel and Matthew Babey on the Progress of the Lightfastness Committee's interlaboratory survey; and from Mr Dorn, Dr Stiegler and Albert E Johnson on water repellency tests for the Federal Trade Commission. Other business considered proposed activities of ECR at the Convention in Chicago next month and the progress of AATCC's new research pamphlet now at the printers.

The American Institute of Laundering has extended invitations to all convention goers to visit its headquarters in Joliet, Illinois, and see its laboratories, laundry plant, school program and other facilities on Wednesday, September 16th. To make it easier to get there, AIL will provide free bus transportation from Convention Headquarters and return. The forty-mile trip is said to take less than an hour and a half. A visit to AIL may help you understand some of the problems of AATCC's Committee on Washfastness in developing laundering tests.

AT RESEARCH HEADQUARTERS

Many laboratories have had difficulty obtaining the apparatus called for in the Dynamic Immersion Absorption Test No. 70-52. In view of this, AATCC has been investigating the use of a motor-driven tumbler jar that is readily available. So far the results have been discouraging because of significant differences in the data obtained with the two devices. Work is continuing on the project, however, in the hopes of finding some way of solving the problem. Meanwhile, checks are being made on the absorbency qualities of currently-available blotters used in this and water-resistance tests.

The AATCC Research Laboratories are cooperating with the Fire Protective Division of the National Board of Fire Underwriters in carrying out interlaboratory tests with the National Bureau of Standards and the California State Fire Marshal's Laboratory to determine the flammable characteristics of wearing apparel fabrics when ignited at various angles.

AATCC is one of the several laboratories now engaged in a survey of daylight and sunlight tests being directed by the Committee on Lightfastness. Both the AATCC and British Light Standards are being used in the survey to evaluate color differences because of the relationship of this work to the proposed International Colorfastness Standards.

COMMITTEE ACTIVITIES

At a recent special meeting of the Abrasion Committee, AATCC Research Laboratories were called upon to undertake the development of a simple mechanical device based on the Crockmeter for use in a pilling test. Chairman Max W Winkler advised that while this committee has been principally concerned with matters relating to the effect of wear abrasion on textiles, it had previously approved taking on the pilling study because of the close relationship of the causative factors involved.

CALENDAR

AATCC

COUNCIL
Sept 17, Nov 20, Jan 22, Apr 30, June 15.

NATIONAL CONVENTIONS
September 17-19, 1953 (Hotel Conrad Hilton, Chicago); Sept 15-18, 1954 (Atlanta Biltmore, Atlanta, Ga); Sept 21-23, 1955 (Chalfonte-Haddon Hall, Atlantic City, N J).

NEW YORK SECTION
Sept 25, Oct 23, Nov 20 (Swiss Chalet); Jan 29, Feb 26 (Hotel Statler, N Y); April 23, 1954, May 21, 1954 (Swiss Chalet).

MID-WEST SECTION
November 7, February 13 (Hotel Bismarck, Chicago, Ill.)

PHILADELPHIA SECTION
Sept 11, Oct 23 (Penn-Sheraton Hotel, Philadelphia, Pa); Dec 4; Jan 15, 1954.

PIEDMONT SECTION
Sept 12 (Hotel Charlotte, Charlotte, N C).

RHODE ISLAND SECTION
Oct 23 (Prov Eng Soc); Dec 4 (Annual Meeting, Sheraton-Biltmore, Providence).

SOUTH CENTRAL SECTION
Aug 21-22 (Outing, Chattanooga Golf & Country Club, Chattanooga, Tenn); Dec 5 (Patten Hotel).

SOUTHEASTERN SECTION
Sept 5 (Ralston Hotel, Columbus, Ga).

WESTERN NEW ENGLAND SECTION
Oct 2, Nov 6 and Dec 11 (Rapp's Restaurant, Shelton, Conn).

NORTHERN NEW ENGLAND SECTION
Nov 6 (LTI); Dec 4 (MIT Faculty House).

OTHER EVENTS

AMERICAN OIL CHEMISTS' SOCIETY
27th Fall Meeting, November 2-4, Sherman Hotel, Chicago, Ill.

AMERICAN SOCIETY FOR TESTING MATERIALS
1953 Fall Meeting, Oct 14-16, New York, N Y.

AMERICAN TEXTILE MACHINERY ASSOCIATION
Exhibit of American Textile Machinery, April 26-May 1, Atlantic City Exhibition Hall, Atlantic City, N J.

TEXTILE RESEARCH INSTITUTE
1953 Annual Meeting, Nov 12-13.

INTERNATIONAL FEDERATION OF ASSOCIATIONS OF TEXTILE CHEMISTS AND COLORISTS
1953 Congress: September 17-19, Luzern, Switzerland (under the auspices of the Swiss Association of Chemists-Colorists).

NEW YORK BOARD OF TRADE (DCAT)
Drug, Chemical and Allied Trades Section; 63rd Annual Meeting, Sept 24-27, Pocono Manor Inn, Pocono Manor, Pa; 28th Annual Dinner, March 4 (Waldorf-Astoria, New York, N Y).

ASSOCIATION OF CONSULTING CHEMISTS AND CHEMICAL ENGINEERS, INC
Annual Meeting—25th Anniversary-October 27 (Hotel Belmont Plaza, New York).

INTERNATIONAL UNION OF LEATHER CHEMISTS SOCIETIES
Barcelona Conference, Sept 13-18, Barcelona, Spain.

GORDON RESEARCH CONFERENCES
June 16-Sept 4 (Colby Jr College, New London, N H).

PHI PSI FRATERNITY
51st Annual Convention, Feb 25-27 (The Carolina, Pinehurst, N C).

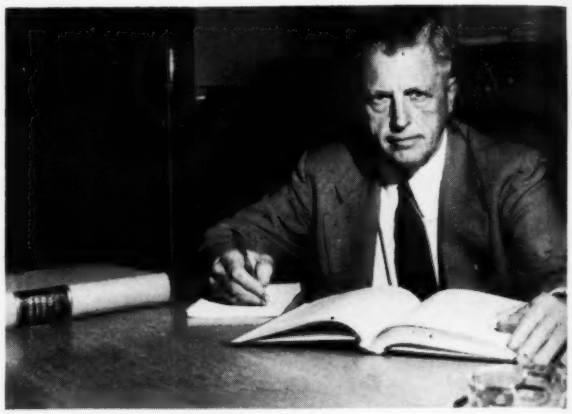
SOUTHERN TEXTILE EXPOSITION
October 4-9 (Textile Hall, Greenville, S C)

Annual Outing, Rhode Island Section, Wannamoisett Country Club, June 12, 1953

Photos by John Trezise, Onyx Oil & Chemical Co.

1953 Olney Medal Award to Roland E Derby, Sr

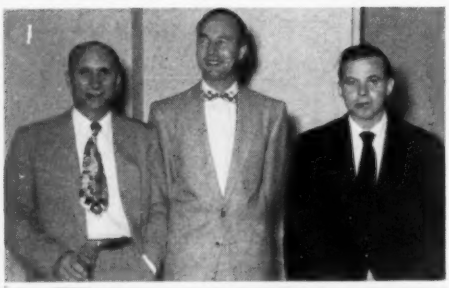
ROLAND E DERBY, SR of Lowell, Massachusetts, head of The Derby Co, Inc, and of Textile Aniline and Chemical Co, Lawrence, Mass, is the 1953 winner of the Olney Medal. The medal will be presented with appropriate ceremony at the Annual Convention in Chicago on September 18.



Meeting Report—— Pacific Southwest Section

June 26, 1953
Haywood Hotel, Los Angeles, Calif

Photos, Courtesy, A R Roberts, Jacques Wolf & Co



(1) J Delabarre, Sandoz; R Andersen, Peerless; J Smith, Dyemasters
(2) R Cernik, Peerless; H O'Briant, National Dyeing & Finishing; T Smock, General Dyestuff
(3) R Hendricks, Geigy; F Haselhorst, Maher
(4) S Springer; S Dadone, L A Piece Dye Works
(5) A H Roberts, Jacques Wolf; E Lindquist, Geigy; S Springer
(6) E Lindquist, Geigy; R Mishell, Dyemasters
(7) H Pike, L A Piece Dye Works; R Nehmens, Du Pont
(8) F Haselhorst, Maher; R Roth, Hess Goldsmith

THE Pacific Southwest Section met on June 26 in the Hayward Hotel, Los Angeles, Calif.

The program consisted of a Westinghouse Corporation film entitled "Adventures in Research", and a Walt Disney color cartoon on the use of electricity in the home.

Plans were outlined for the annual outing to be held October 10th at Ojai Valley Country Club.

Future programs will include a symposium on the economical and technical prospects for the printing industry in Southern California (November 20), and a talk by Sidney Edelstein, Dexter Chemical Corporation on "Contributions of the Chemical Salesman to the Textile Industry" (January 29th).

Respectfully submitted,
CLARICE LINDSEY, *Secretary*

ONE HUNDRED AND EIGHTY-SEVENTH COUNCIL MEETING

THE Council held its 187th meeting in the Hotel Willard, Washington, D C, on Friday morning, June 5, 1953. Present were President J Robert Bonnar presiding; Arthur W Etchells and George O Linberg, *Vice Presidents;* Albert E Sampson, *Assistant Treasurer;* Leonard S Little, *Chairman of the Executive Committee on Research;* William D Appel, Carl Z Draves and Thomas R Smith, *Past Presidents;* Edward B Bell, Elmer E Fickett, Frank J O'Neil and Sawyer F Sylvester representing Northern New England; Edward W Lawrence representing Rhode Island; Raymond J Carey representing Western New England; Charles W Dorn, Weldon G Helmus, James J Marshall and Henry L Young representing New York; Ernest E Rettberg, Jr, Richard B Stehle, Percival Theel and Jackson A Woodruff representing Philadelphia; Walter M Scott representing Washington; R Hobart Souther representing Piedmont; Kenneth H Barnard of the Committee on Conventions; George L Baxter of the Corporate Membership Committee; William A Holst of the Committee on Constitution and Bylaws; George H Schuler and Glenn D Jackson Jr of the Publicity Committee; Jules Labarthe Jr; Charles A Sylvester; and H C Chapin, *Secretary.*

The Secretary's report of the 186th Council meeting and financial report of May 11, and the Treasurer's report of May 18, were accepted. The budget submitted by the Appropriations Committee was adopted.

The amendments to the Bylaws proposed at the 186th Council meeting were reported adopted by letter ballot of the Council. In accordance therewith, Mr Little became Chairman of the Research Committee named in the Constitution, in his capacity as Chairman of the Executive Committee on Research.

For his Committee, Mr Little cited the need of further funds, and described preparation of an elaborate bulletin with photographs designed for use in soliciting them. He announced importation of "grey scales" from England, and of the sets of two used in Germany, France and Switzerland, all three of which could be obtained from the Secretary of the Association at $1.50 per set, or $4.50 for the lot. These are intended for the evaluation of fading and staining. He also announced that the Federal Trade Commission was holding conferences on water repellency with a committee headed by Mr Dorn. The Association is collaborating with the National Fire Protective Association on tests to be offered for incorporation in legislation. The Association test method is incorporated in current National legislation.

Mr Baxter reported an increase in Corporate members but at a lower average dues rate, indicating the need of more active solicitation to get further increments in funds.

For the Publicity Committee, Mr Schuler described a proposed series of short articles, each on some particular phase of Association activity.

For the Publications Committee, Professor Theel announced publication of "The Application of Vat Dyes," now available from the Secretary at $5.00 to members and $6.00 to others. Thanks were voted to the Board of Editors, and to Professor Theel for arranging publication. It was reported that the 1953 Year Book would be out near the end of August. The judges for the American Dyestuff Reporter Award of 1953 are Ethel L Phelps, John N Dalton and Alfred R Macormac. C A Whitehead is now a member of the Committee with the special duty of getting for publication the papers presented before Sections. A suggestion from the Society of Dyers and Colourists, that "Acetate Dyes" be called "Disperse Dyes", has been adopted for future publications, but with the intent of publishing both names until the new one becomes familiar.

Mr Barnard stated that most exhibit space for the Chicago convention had been sold. Frank J O'Neil had agreed to arrange the Student Contest. The Piedmont Inter-Sectional Contest paper was the first in the hands of the judges.

Reporting for P J Wood of the Committee on New Personnel, Mr Sampson said that the Committee had made progress in accumulating data, but would like to confer with the President and Vice Presidents on future policies of the Association before making specific recommendations.

Mr Schuler reported for the Committee on Colour Index Editing and Mr Sampson for that on Marketing, presenting a prepayment plan similar to that of the Society of Dyers and Colourists, at $85.00 for full prepayment.

Future Council meeting dates were voted as follows:

1953—Sept 17 (convention); Nov 20.

1954—Jan 22; April 30; June 15; Sept 15 (convention); Nov 19.

SECRETARY'S FINANCIAL REPORT—MAY 11, 1953

	Applications	*Dues, regular & reinstate*	*Dues, Corporate & Sustaining*	*Miscellaneous*	*Totals*
Received and transmitted to Treasurer,					
August 1, 1952 to March 26, 1953.	$3,768.00	$43,513.50	$46,507.50	$ 9,705.23	$103,494.23
March 26 to May 11, 1953.....	519.50	558.00	1,320.00	3,247.89*	5,645.39
Total in fiscal year to date.....	4,287.50	44,071.50	47,827.50	12,953.12	109,139.62
Leaving deposited by Treasurer with Secretary.....					9,635.01
	4,479.50	42,628.25	44,337.50	13,915.69	105,360.94
Miscellaneous items					*
Dividends and interest.....					534.20
Reporters and reprints.....					26.75
Year books					226.54
Crockmeters					533.79
Crock cloth					139.41
Moth cloth					27.50
Water test apparatus.....					38.35
Dyed standards					25.00
Gas fading units.....					91.45
Buttons					14.00
Color transfer charts.....					103.25
Flammability apparatus					1.00
"Analytical Methods"					47.00
"Application of Vat Dyes".....					1,168.50
Cotton skeins					26.50
Grease wool, standard.....					1.50
Multifiber cloth					243.15
					$ 3,247.89

H C CHAPIN,
Secretary

1955—Jan 21; April 15; June 17.

Presented by Mr Etchells with approval of his Committee, each of the following was elected to the class of membership indicated:

CORPORATE

Atlas Powder Co
The Orr Felt & Blanket Co
Princeton Hosiery Mills
Prospect Chemical Company
The Roxborough Company
The Springs Cotton Mills
Fred Whitaker Co, Inc

SENIOR

Angevine, W H Jr
Blakely, E Jr
Bolander, R G
Bouthillier, C E
Boyd, T B
Brassell, A L
Bretschger, P U
Brusco, R J
Buck, C E
Collette, F
Costello, M H
Cuddeback, R H
Davis, R E
Dittmar, R G
Dowlen, R P
Ellis, J R
Ellsworth, H W
Ewan, L
Falconer, W A
Gagnon, R O
Geselbracht, G A
Gordon, E H
Greer, J H
Groff, S B
Hazekamp, E W
Kamphausen, E
Keefer, D L
Kowal, S F
Leventhal, H L
Long, F W
McCarty, G S Jr
McCullough, H S
Miller, K E
Mudge, F C
Murray, A
Nistico, F
Parker, M F
Pfeffer, E C
Purnell, J H Jr
Rice, J W
Scrima, D
Seguin, J P
Shull, R L
Sirbola, J
Synan, J F
Tobin, D J
Van Gorder, N
Veal, D E
Vits, H
Watson, R E
Weissink, J L
Zona, H E

JUNIOR

Connery, W S
Deobler, R W
Fink, S W
MacDonald, B
Pomeon, J C
Skelton, F S
Swain, F P Jr
Vosburgh, U

ASSOCIATE

Bartholomew, C J
Bennett, G D
Foster, D
Greenwald, M M
Hood, D L
Kan, S
Mattair, R
Nelson, D H
Ogino, S
Porter, S Jr
Raspino, M
Scott, J D
Tillett, J Jr
Weinberg, M

STUDENT

Anenberg, H
Berman, L
Durrani, V H K
Kunik, R J
Lunsford, C C Jr
Medina, L F
Murphy, T P
Orr, J O
Pappalardo, F V
Rothman, M
Schapow, R
Snyder, S D
Webb, E P

TRANSFERRED FROM OTHER CLASSIFICATIONS TO SENIOR

Combs, R N
Cooney, W J
Cote, R E
Deobler, R W
Silver, A
Teixeira, N A
Wyskoczka, W J

Respectfully submitted,
H C CHAPIN, *Secretary*

J Dalton, M Lane, G Goulston

NNE Outing Termed "Very Successful"

MEMBERS and guests attending the Annual Outing of the Northern New England Section Outing on June 19th at the Merrimac Valley Country Club, Methuen, Mass, came away with the feeling that the affair had been very successful.

Ernest Kaswell, NNE Section Chairman, in introducing Paul McCarthy, Outing Chairman, noted that this was one of the very few occasions in the history of the Section that an outing had been run by a millman. Mr McCarthy called atten-

H Wieland and A Walz

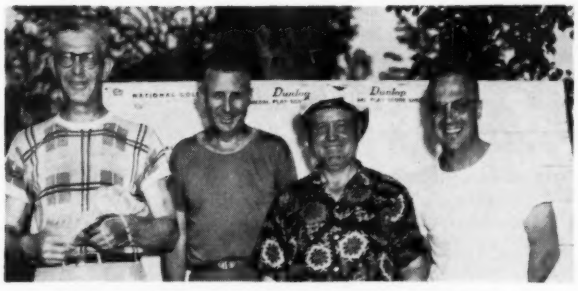
Standing: W Durfee, J Travers, A Mack, P McCarthy, G Linberg. Front: W Pennock and E Kaswell.

Back Row: R Strickland, A Burke, J Travers, G Smith, B Worsmen, H Walz. Front Row: J Murphy, J Binns, P Robbins, C Brown, N Clearey.

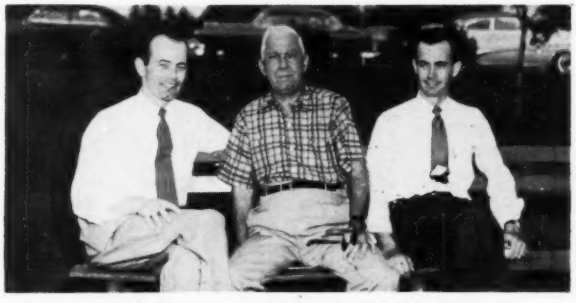
E Kaswell, W Schmottlach, P Graham

T Peel, E S Chapin, T Shoesmith

H L Ortstein and C Nutting



W Dewing, W Latham, D Dushame, J E Ormiston, Jr



J McChesney, H Buckley, K McChesney

tion to the fact the Prizes Committee, under the direction of Frank Benvie and Mike Keane, was able to obtain sterling silver pieces as prizes for the various golfing and other activities.

A total of 35 door prizes were drawn, the first prize, a Goodall-Sanford Springweave custom-made suit, going to Sam Kershaw.

Entertainment was provided by Harold Kaswell as well as the special trio of John Dalton pianist, Mike Lane, soloist, and George Goulston, accordionist.

It was reported that the money necessary for continuing the Section's sponsorship of a $250 scholarship to a worthy Junior at Lowell Tech had been made available.

Report of the Nominating Committee

The Councilors representing Sections, in their capacity as Nominating Committee, have nominated J Robert Bonnar for President in the year 1954. The nomination of any other Senior member, signed by fifty or more Senior members, may be filed with the Secretary not later than October first, and will be given equal standing on the ballot.

The members of the Northern New England, Rhode Island and Western New England Sections will elect a Vice-President for the New England Region. The Councilors from this Region have nominated George O Linberg.

The members of the Hudson-Mohawk, New York and Philadelphia Sections will elect a Vice-President for the Central Atlantic Region. The Councilors from this Region have nominated George L Baxter and Arthur W Etchells.

The members of the Piedmont, Southeastern and South Central Sections will elect a Vice-President for the Southern Region. The Councilors from that Region have nominated Samuel L Hayes.

The members of the Mid-West, Pacific Southwest and Pacific Northwest Sections will elect a Vice-President for the Western Region. The Councilors from that Region have nominated Joseph H Jones.

A nomination for Vice-President from any Region, signed by twenty-five or more members of that Region, may be filed with the Secretary not later than October first, and will receive equal standing on the ballot with other nominations for that office.

Harold C Chapin, Secretary.

AATCC IN THE INTERNATIONAL TESTING PROGRAM

THE American Association of Textile Chemists and Colorists for the last two years has been closely identified with the International Standards Organization as one of the co-operating American groups. Exploring the possibility of an international agreement on testing methods has been a most interesting experience for many of the committee members. It is not surprising to learn that in each country there has been considerable progress internally in standardizing testing methods so that there is understanding of the relative merits and demerits of the many competing fibers and fabrics. But this general good understanding does not always extend beyond the borders of the country unless, as has so frequently been necessary, there is duplicate testing according to several methods. Unless the extra work is done there has been confusion in export business.

When colored yarns or fabrics are tested to determine the stability of the color to wet treatments it is customary to include with the test material some undyed multifiber cloth to detect any color bleed. If there is no color bleed, and thus no staining of the undyed fibers, it is simple to rate the color as being very good or to give the rating "5" on a scale of 1-5 where "5" is very good and "1" is very bad. If staining does occur it is not always so easy to assign correctly ratings of 1 to 4 to indicate the degree of staining so that ratings made at different times will agree.

For many years AATCC has sold, and is still making available to interested technologists through the Secretary's Office at Lowell, Massachusetts, a chart for measuring transference of color, which contains 24 chips selected from Munsell Color Charts. They illustrate variations in depth of shade in four steps of six hues—gray, pink, drab, green, blue and violet. Directions for using the chart in assessing color transference are given and clever mechanical assistants are furnished to facilitate the use of the chart. This service has been of real value to technologists in rating fastness tests and is in regular use in textile and dye laboratories.

The Continental Fastness Commission, which correlates fastness testing for Germany, France and Switzerland, has issued a pair of gray scales, one of which shows contrasts that permit the rating of staining of adjacent fibers from 1 to 5, and the other, contrasts that facilitate the rating of shade changes caused by the test treatment on the original dyeing, (also on a scale of 1 to 5).

The Society of Dyers and Colourists, troubled with the same problem, has developed an International Geometric Grey Scale, consisting "of five pairs of grey areas, the first pair grade 5, showing no contrast, and the last pair, grade 1, a considerable contrast, the spacing between them increasing geometrically. The fastness rating of the pattern is that number of the Grey Scale which corresponds to the contrast between the original and treated patterns". Those who developed this scale claim it is just as easy to rate contrast in colors against a gray scale as it is against scales of colors which resemble the one being rated.

Both the Continental and the English gray scales are available in this country from the Secretary's Office at Lowell at a cost of $1.50 for the single English scale, and $3.00 for the pair of Continental Scales.

These several aids to rating the results of fastness tests are, at the present time, not in agreement with each other. This should not cause surprise, since they were set up independently. It can cause confusion because the gradations vary, but a similar numbering system is used for giving the rating.

On a preliminary basis some American technologists have expressed a preference for the AATCC Color Transference Chart. The chairmen of committees interested in such assessments are now attempting a comparative evaluation of the gray scales with the AATCC Chart. Familiarity with the use of one of the scales will naturally tend towards the development of a preference for that particular one. Having in mind, however, the constructive objectives of the International Standards Organization, a serious effort will be made to cooperate in setting up one standard method of making the tests and evaluating and recording the results.

49 EXHIBITORS AT CHICAGO CONVENTION

FORTY-NINE exhibitors have taken space for the forthcoming Chicago Convention, to be held September 17-18-19 at the Conrad Hilton, Chicago, Illinois.

A preliminary list of exhibitors follows. A comprehensive list, which will include booth space, a description of each exhibit, and a listing of personnel in attendance will appear in the August 31st Convention issue.

AATCC National Intersectional Contest Committee
AATCC Research Committee
American Aniline Products, Inc
American Bemberg Corp
American Dyestuff Reporter
American Optical Co, Instrument Division
America's Textile Reporter
Anderson Machine Shop, Inc
Atlas Electric Devices
Bersworth Chemical Co
Brush Electronics Co
Calco Chemical Div, American Cyanamid Co
Carbide & Carbon Chemicals Co, A Division of Union Carbide and Carbon Corp
Ciba, Inc
Custom Scientific Instrument Co
Daily News Record
Dow Corning Corp
E F Drew & Co
Dyestuff Div, E I du Pont de Nemours & Co, Inc
Encyclopedia Britannica
Gaston County Dyeing Machine Co
Geigy Co, Inc
General Dyestuff Corp
General Plastics Corp
Glyco Products Co, Inc
B F Goodrich Chemical Co
Hilton-Davis Chemical Co, A Division of Sterling Drug Inc
E F Houghton & Co
International Salt Co
Modern Textiles
Monsanto Chemical Co
Morton Salt Co
National Aniline Div, Allied Chemical & Dye Corp
Nopco Chemical Co
Owens Corning Fiberglas Corp
Pittsburgh Coke & Chemical Co
Riggs & Lombard, Inc
Sandoz Chemical Works, Inc
Scholler Bros Inc
Scientific Oil Compounding Co
Seydell-Woolley & Co
Textile Age, Inc
Textile Bulletin
Textile Industries
Textile World
United States Testing Co, Inc
Victor Chemical Works
Virginia-Carolina Chemical Corp
Jacques Wolf & Co

New York Section——

THE USE OF RADIOISOTOPES IN THE TEXTILE INDUSTRY*

CHARLES E CROMPTON†
Assistant Director, Isotopes Division
Oak Ridge, Tennessee

INTRODUCTION

I AM sure all of us have been stimulated in our thinking by the extensive discussions in the press on the future of atomic energy. We have also heard of many marvelous accomplishments in physical and medical research made through the use of radioisotopes.

Being human, however, each of us is most impressed by an advancement that affects us personally. Present discussions of future atomic power production fall far short in this respect. Advances made in physical and medical research improve both our environment and our health and therefore strike home more closely. A new technique that permits us to do our daily job better really makes us sit up and take notice.

However, despite our natural interest, we are, as technical and professional men, naturally reserved in our evaluation of any idea. Such reservations must always be tempered by our research approach to problems.

Charles Kettering aptly said, "When research is needed, it is already too late." Here then is the purpose of the Research Advisory Committee set up by your Association: to evaluate a new idea, the use of radioisotopes in the textile industry. This presentation is in the nature of a preliminary evaluation.

How useful is this new technique that has been called the greatest development since the microscope? You can detect 10^{-5} micrograms of many elements by this method, but can it be used to improve your product? You can trace individual atoms or molecules through complicated processes, but will it solve your specific problem?

I doubt that this brief discussion will answer everyone's questions, but we shall attempt to show you what has been done with radioactive isotopes and what can be done.

The members of the Committee believe that tracers are certainly not the answer to every problem; that many answers can be gotten more easily and more inexpensively by other techniques. The Committee does agree that the tracer technique opens up a whole new realm of possibilities when it comes to getting needed information. It is a versatile tool that might profitably be considered for the solution of many existing and future problems.

I will be quite honest in saying that the textile industry has not yet exploited this technique to any appreciable extent. While I am naturally disappointed to see this state of affairs, there is a perfectly reasonable explanation for it.

In the eyes of the academic research man there was never any question about the tremendous sensitivity and versatility of radioactive tracers. Early work with the cyclotron-produced isotopes clearly proved that point. Wartime atomic-energy developments answered a long-standing demand for large quantities of inexpensive radioisotopes. The Commission has now been distributing them for peacetime purposes for over six years.

Industry cannot be equally quick in appraising new techniques. The academic scholar is not concerned with time and economics—only the best means of solving his problem. Industry, on the other hand, must weigh any new technique—no matter how powerful or spectacular it may be—on the scale of economics. This discerning judgment, needed in any business, must also be teamed with some pioneering spirit on the part of those individuals in any group who champion the new idea and show management its merits.

C E Crompton

With the distribution of radioactive isotopes by the Atomic Energy Commission to any interested responsible persons, a brand-new technique has now become available to the textile industry for the solution of problems that were formerly very difficult. Although the use of radioisotopes has not yet been properly exploited in the textile field, the present article should be most useful in calling the attention of textile chemists to the possibilities of the new method for following the course of small amounts of such substances as dyes, soils, and finishing agents in scouring, dyeing and finishing. The present article points out how radioisotopes are to be obtained and under what conditions they are to be employed and disposed of in research.

EXAMPLES OF USES

The uses we shall talk about today are the result of such pioneering spirit. The originators of these uses have shown management that there are many situations and problems for which radioisotopes offer the best solution. An important fact to remember is that these uses represent only a modest beginning. Let's first look to see just what has been done:

Figure 1 indicates how the industrial use of radioisotopes has increased from year to year. Interest in isotopes has been a true chain reaction, since word of success has spread in ever-increasing circles to new companies.

Figure 2 summarizes types of industrial uses for radioactive materials. A fixed source of radiation can be used to radiograph welds or flaws in heavy castings in a manner similar to X rays. A small source of radiation may be used in a thickness gage in continuous production of metal, rubber, or coated materials.

The attenuation of radiation by matter has also been adapted to making gages that indicate the liquid level or the density of fluid inside of heavy metal tanks.

Since radiation is easily detectable it is logical to use it as a signal to locate objects. In one use a source of activity has

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* Presented at the Hotel Statler, New York, N Y, on Feb 27, 1953.

† Contributing author to *Radioactivity Applied to Chemistry*, J Wiley & Sons, New York (1951).

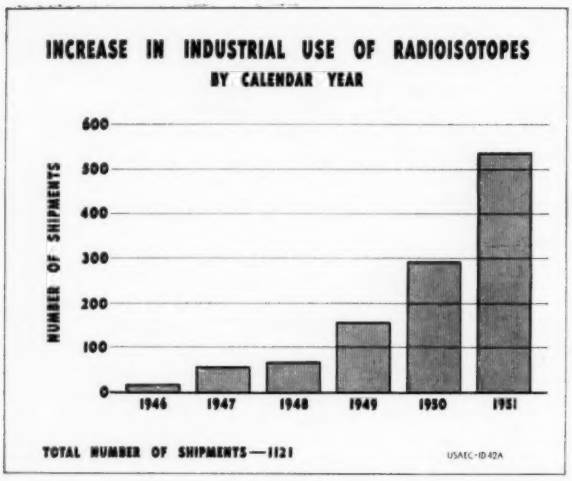

Figure 1

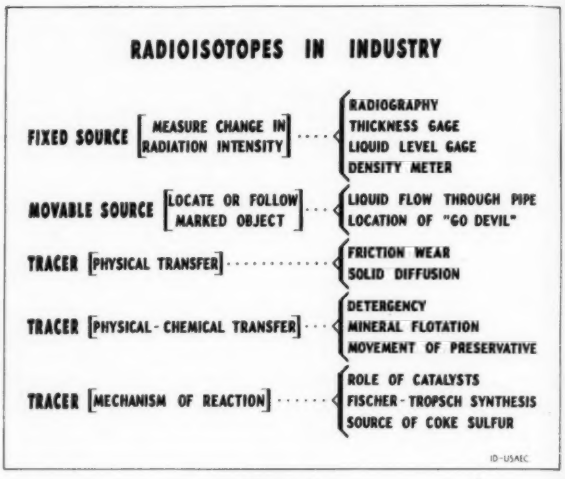

Figure 2

been attached to a pipeline scraper called a "go-devil" to locate the scraper when it becomes lodged.

Wear studies characterize the use of tracers as a means of detecting physical transfer. The life of a machine cutting tool or a piston ring may be accurately measured by making the metal radioactive. This is done by irradiating the metal in the atomic pile and then detecting the loss of radioactive metal during wear.

Radioactive tracers are most versatile as tags on particular atoms or molecules. In this role they serve not only to identify the atoms or molecules wherever they might go, but the quantity of radiation given off also indicates the number of atoms present at any location. Tracers have found a galaxy of uses in elucidating the mechanisms of reactions in chemistry and biology.

To appreciate the usefulness of radioactive isotopes it is important that their characteristics be fully understood. Although the majority of you may already be conversant with the subject, Figures 3 and 4 depict the salient features of such isotopes.

Figure 3: Man-made isotopes, C-10, C-11 and C-14, are not stable. As they disintegrate, they emit beta and/or gamma radiation.

Figure 4: (a) Alpha radiation consists of helium nuclei and is characteristic of naturally occurring radioactive elements. It is weakly penetrating and is not considered in this paper.

(b) The majority of reactor-produced radioisotopes give off a mixture of beta and gamma radiation. Beta particles are high-speed electrons which can penetrate matter only to a limited extent.

(c) Gamma radiation is similar to X rays or cosmic rays and is only slightly diminished in intensity by interposing barriers.

STATIC ELIMINATION——With reference to textile manufacturing, let me say that there is not yet on the market a static eliminator made from Commission-supplied radioactive isotopes. Several companies are working on the perfection of such an eliminator, and I have no doubt but that it will become a reality. When this is accomplished it will be a great boon to many industries. The radiations ionize the air between the moving yarn or belts of cloth and provide a low-resistance path for accumulated static.

THICKNESS GAGES —— The radioactive thickness gage has already become a fairly common instrument in industry and as growing in popularity by leaps and bounds.

Figure 5 illustrates one type of thickness gage in which the radioactive source is located on one side of the moving sheet of material and the electronic detector of the radiation, on the opposite side. The basic principle behind this use is that the amount of radiation reaching the detector is dependent upon the thickness of the interposing matter. Beta-emitting radioisotopes are ordinarily used in this device, and a very minute variation in thickness results in a detectable variation in the amount of radiation recorded by the detector.

One of the large rubber companies uses a beta thickness gage to measure thickness of rubber sheet as it leaves a calendering machine. Tire fabric is impregnated with the rubber and the thickness gage continuously determines the thickness of the fabric by recording variations of several ten thousandths of an inch. A virtue of this gage is that there is no actual contact between the gage and the material it measures, and yet its accuracy is approximately

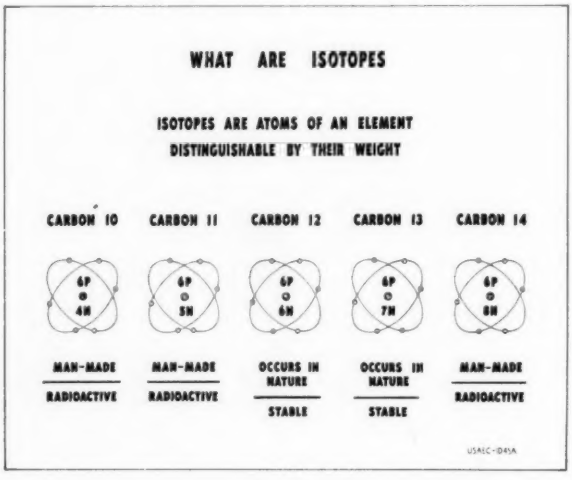

Figure 3

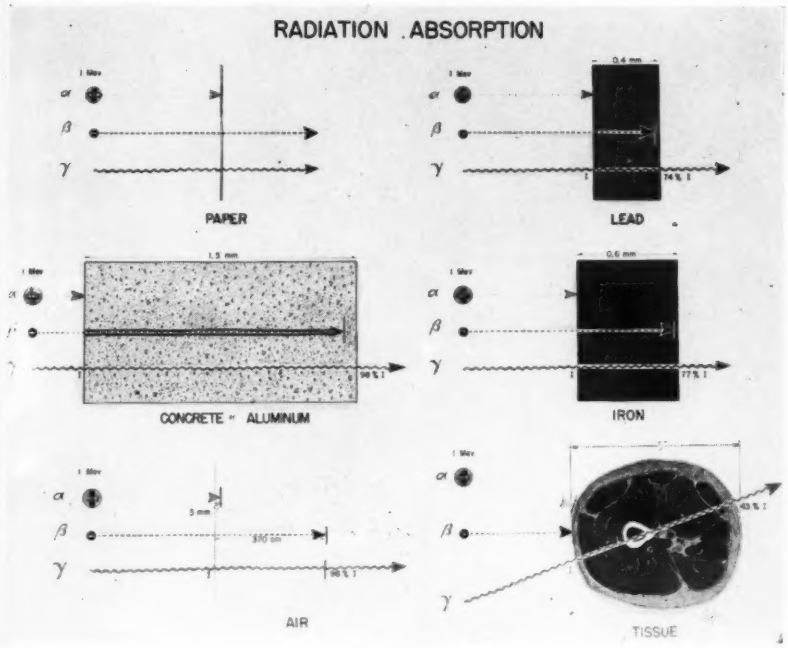

Figure 4

1%. It saves time in testing by recording automatically and is often electronically connected to production machinery to make compensating adjustments in equipment when needed. It may be used on material weighing up to about 600 mg/cm², which corresponds to about one quarter inch of plastic. Multiple units are quite common.

Figure 6 outlines the production of coated abrasives with a thickness gage determining first the thickness or weight of the backing material (gages can be calibrated in lbs per square yard if desired); the second measures the weight of backing plus adhesive; the third includes the weight of the abrasive; the fourth measures total weight after preliminary cure; and the last gage measures final weight after the last adhesive application. All gages in this installation record continuously. This reveals any variation in a particular operation immediately, and compensating corrections can be initiated. The general result of using these gages is time saved in testing production samples and improved uniformity of product.

COLOR MIGRATION IN PRINTS—— There is one other production use in which I believe you will be particularly interested. At a symposium of the British Society of Dyers and Colourists in October of last year, there was presented a solution to the long-standing problem of color "migration" in multicolor printing machines. Since all the print rolls are in contact with a common fabric, the strongest color often infiltrates other dye boxes and causes "soiling" of the entire pattern.

A new means of control was developed using a radioactive tracer, and I understand it has recently been patented in this country. Extensive tests of the method included five printing runs with vat colors and five with azoics. The results showed there was a complete absence of soiling in the fabric, although the printer allowed the process to run up to the danger line.

This represents a real achievement since the absolute elimination of soiling has seldom been achieved in the past. Lengths of printed material of a thousand feet or more are often downgraded because the gradual build-up of soiling is difficult to detect during production.

Let's look at *Figure 7* to see just how radioisotopes were used in solving this problem. The radioisotope used is phosphorus 32, which emits beta particles and has a half-life of fifteen days. This means that after 15 days 50% of the radioactivity remains, after 30 days 25% remains, after 45 days 12½% remains, and so on.

Phosphorus 32 is added as an aqueous phosphate solution to the predominant color of the pattern to give a predetermined level of radioactivity. The exact value will, of course, be determined by the critical soiling level of the particular pattern. Two Geiger counters, immersed at either end of the dye box containing the most sensitive color, record continuously to indicate the gradual invasion of the so called "pirate color." When the recorder reaches the critical limit, it automatically stops the printer.

It may be said that the amount of phosphate taken up per square yard of fabric

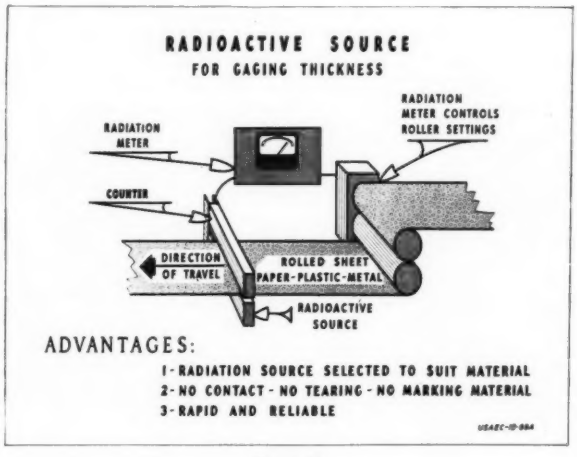

Figure 5
Thickness Gage

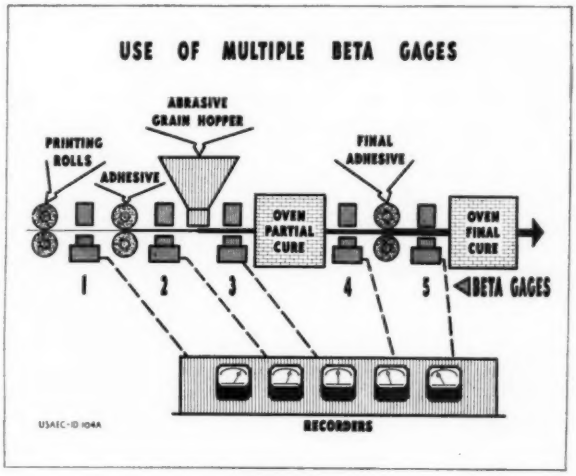

Figure 6
Multiple Gages

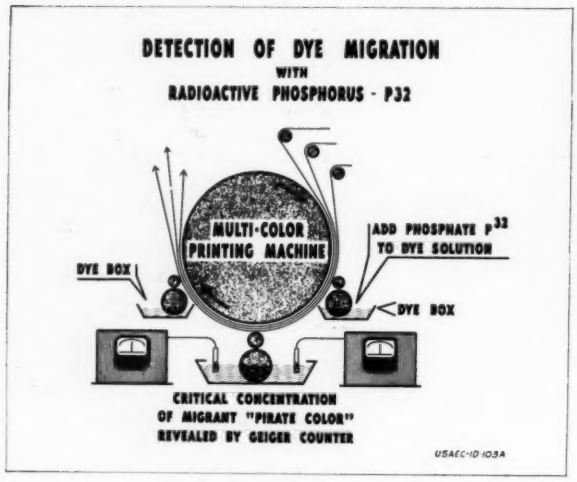

Figure 7

Figure 8
Radioisotope Laboratory

is a negligible cost factor. Continuous production for a week would require only about $50 worth of radioactive phosphorus. Since only beta radiation of short half-life was present, the printed textile is soon safe for handling and distribution. With such a short half-life, the amount of detectable radioactivity at the time of sale was negligible. This application was developed as a result of collaboration between a Scottish dye firm and an outside consultant group experienced in radioisotope work.

RADIOISOTOPE LABORATORY—— A number of reliable consulting organizations experienced in isotope problems are active in this country. Should your company wish to start its own radioisotope laboratory, there are brief training programs at Oak Ridge and elsewhere to provide an introduction to the practical and theoretical side of the subject. To begin in a very modest way, you do not need elaborate facilities and before we go on to discuss research applications, it might be interesting to consider what might actually be involved in a simple radioisotope set-up.

Figure 8: This average small chemical laboratory area contains a good exhaust hood. A glove box is also advantageous for handling radioactive solids. Geiger counter and electronic scaler shown here are preferably kept in a nonlaboratory area.

Figure 9: A broken-down view of a shipping container from Oak Ridge with a small bottle of radioactive solution. Sources of greater activity are shipped in heavy lead containers to provide adequate protective shielding.

Figure 10: The unloading of an Oak Ridge shipping container is monitored with a radiation survey meter to measure exposure received by personnel. A person may be exposed to small amounts of radiation without any known harmful effects.

Figure 9
Simple Shipping Container
for Radioisotopes

Figure 10
Radiation Survey in Unloading
Radioisotopes

Figure 11: A simple remote-control pipet is used to withdraw radioactive solution from a bottle housed in a lead cylinder. For low level radiation, relatively simple precautions suffice. Note lead bricks, rubber gloves and waste disposal can for tissue.

Figure 12: A simple laboratory operation involves the filtering of a phosphate precipitate containing a small amount of P 32. Note absorbent paper on the working surface and lead shield and rubber gloves.

Figure 13: Since the tracer technique is unusually sensitive, semimicro methods are ordinarily employed in laboratory analyses. In this view, an aliquot of solution is delivered onto a small planchet from a volumetric pipet whose volume is only 0.01 milliliters. The solution is finally evaporated under an infrared lamp before the radioactivity of the sample is measured.

Figure 14: A typical counting room with investigator inserting a sample into the lead-housed counting chamber.

The last production application we discussed involved the use of a radioisotope as a tracer. It is in the role of a tracer that radioisotopes are most versatile. You need only glance through the Commission's "Five-Year Summary of Isotope Distribution" to satisfy yourself on this point.

GENERAL ROLE OF ISOTOPES IN TEXTILE RESEARCH

For purposes of discussing the role of radioisotopes in textile work we may conveniently divide tracer applications into two categories: (I) physical-transfer studies and (II) mechanism studies.

TRANSFER STUDIES——In a discussion of the first category there immediately

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comes to mind those many instances in textile technology where you would like to know to what extent a given substance has been removed from the fiber, as in the following examples:

(a) Spinning oils are used as lubricants and later dyeing assistants are used to remove these oils. But an important question is, "How completely are they removed?"

(b) Wetting agents are used in many operations and then removed. Often the completeness of their removal is essential to assure the success of later treatments. How completely are they removed?

(c) The removal of certain types of soiling agents is important in studying both fiber properties and detergency.

By tagging the spinning oil or the wetting agent or the soil constituent with a radioactive isotope it is possible to answer these questions with great accuracy.

One of the earliest applications of tracers in the textile field was the measurement of the distribution of a lubricant on a rayon yarn. Since this lubricant contained sodium oleate, radioactive sodium 24 was used to tag this compound. Uniformity of distribution was measured by taking samples of the yarn which were only one centimeter long and weighed only 0.2 gram. The amount of radioactive sodium on each sample was 0.04 micrograms.

Figure 15 illustrates a detergency study in which the deposition of calcium on cotton was measured. A small amount of radioactive calcium 45 was used as calcium bicarbonate in the wash water. The cotton swatches were then introduced and the desired washing cycle carried out with the detergent in question. After the swatches were rinsed and dried, the radioactivity of a known area of the cloth revealed exactly how much calcium had been adsorbed or otherwise deposited on the material. This technique is capable of extreme sensitivity, and similar measurements can be made with various trace constituents.

In detergency studies, radioactive carbon black, fatty acids and even radioactive bacteria have been used.

In discussing the potential of this technique, the Committee agreed that the greatest possibilities lay in the study of the role of chemical auxiliaries in textile manufacture and of the *permanence* of textile finishing agents. There are any number of agents whose permanence and performance are poorly understood and which might profitably be studied. Among these agents we might mention those concerned with prevention of static electricity, fire resistance, water resistance, crease resistance and mildew resistance.

In each of these cases, however, the synthesis of the isotopically labeled organic compound looms as a substantial part of the problem. True, there are now well over two hundred organic compounds commercially available that are tagged with radioactive carbon fourteen. Yet, the synthesis of exactly what you need may require a delay and add a material cost to your program. However, on the other side of the ledger, once a small amount of such a compound has been prepared, an enormous number of different experiments can be carried out with it. There are many laboratories, both industrial and consulting, that are equipped to carry out these syntheses of tagged organic compounds. In some types of applications—like the phosphate in the multicolor printing machine—the precise compound may not have to be synthesized to give the desired results. This, however, is the exception rather than the rule. A tagged compound is a *faithful* label and permits you to detect unprecedented traces of material with surprising accuracy.

I should like to affirm here that a molecule of the radioactive compound behaves in EVERY way exactly like its nonradioactive counterparts.

The availability of a number of compounds of peculiar interest to the textile field would certainly stimulate interest in this technique and speed progress in the development of radioisotope applications. In view of this, the Committee has suggested that consideration be given to establishing a central pool or registry of isotopically labeled compounds prepared by members of those companies interested in textile developments. Unused portions of labeled compounds could be made available to other investigators for use as such, or as intermediates in the preparation of related compounds. In its early stages this exchange of compounds could be accomplished by very informal co-operation. The Committee itself could keep the registry or list of available compounds.

In connection with the function of textile auxiliaries it should be mentioned that, while the exact degree or extent of adherence of compounds (such as crease- and mildew-resistant agents) may be measured by the radioisotope technique, the actual distribution on the fiber itself may also be revealed. This distribution on the fiber may be revealed by a method known as *autoradiography*. It involves placing the fiber or a thin section of the fiber in intimate contact with a thin sensitive photographic emulsion (*Figure* 16). The radiations from the tagged compound distributed on the fiber expose the photographic emulsion in such a way as to reveal the type of distribution of the compound itself. The most intense areas of developed film blackening indicate the greatest concentration of the chemical compound. This technique is capable of a sensitivity which will reveal the biological concentration of a tagged compound in the wall of a single living cell. It could most certainly be adapted to the study of textile fibers.

Figure 11
Pipet for Removal of Weakly Radioactive Solution

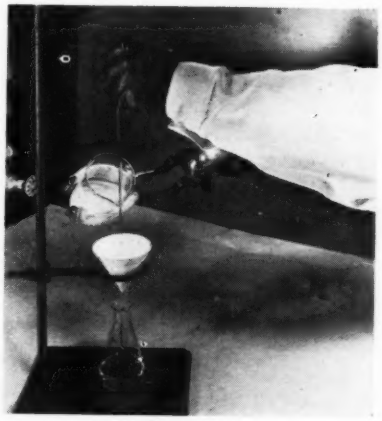

Figure 12
Separation of Radioactive Phosphate Precipitate by Filtration

Figure 13
Micropipet for Radioactive Solutions

Figure 14
Lead-Housed Counting Chambers

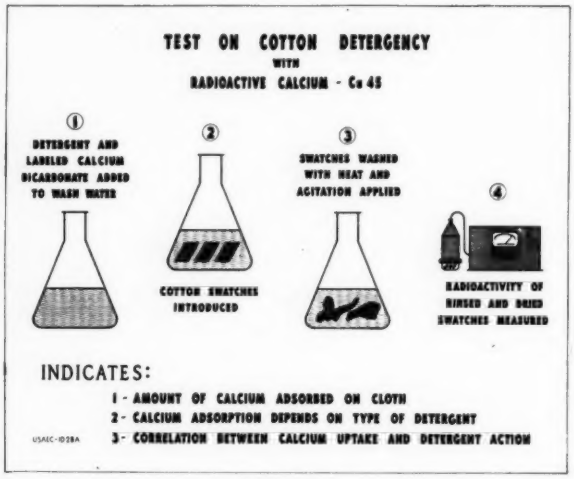
TEST ON COTTON DETERGENCY
WITH
RADIOACTIVE CALCIUM - Ca 45
①
DETERGENT AND LABELED CALCIUM BICARBONATE ADDED TO WASH WATER
②
COTTON SWATCHES INTRODUCED
③
SWATCHES WASHED WITH HEAT AND AGITATION APPLIED
④
RADIOACTIVITY OF RINSED AND DRIED SWATCHES MEASURED
INDICATES:
1 - AMOUNT OF CALCIUM ADSORBED ON CLOTH
2 - CALCIUM ADSORPTION DEPENDS ON TYPE OF DETERGENT
3 - CORRELATION BETWEEN CALCIUM UPTAKE AND DETERGENT ACTION
USAEC-1028A

Figure 15

MECHANISM STUDIES IN TEXTILES ——Mechanism studies, our second category of tracer uses, are simply one step more advanced in complexity than those applications we have just talked about.

The mechanism of dyeing is,*I suppose, the first application anyone would think of. The British wool industries have been quite enthusiastic over their results obtained on the chemistry of wool dyeing using the tracer technique. However, by virtue of their characteristic absorption spectra, dyes are already quite easily detected, and we do not feel that this is the most appropriate use for radioisotopes in textile research.

The roles of the various inorganic components of a dyebath are poorly understood, and the elucidation of their function would go a long way toward putting us on a firm ground in this field. This is a much more logical area for tracer work. The Textile Research Institute at Princeton has done some work in this connection. In studying the chemistry of dyeing, a major problem is the distribution of the dyes, salts, wetting agents, solvents, etc between the bath and the textile under nonexhaustive conditions. These workers used Anthraquinone Blue, which was sulfonated with a sulfur 35-tagged sulfonating agent. Sulfur 35 emits very weak beta particles. The salt used was sodium bromide, in which both the sodium and bromine were radioactive. The sodium in this case was sodium 22, which has a long half-life, whereas the bromine involved was bromine 82, which has a half-life of 34 hours. Both of these isotopes emit energetic gamma radiation. The radioactivity of the fiber in the dyeing bath could be measured periodically to determine the rate at which these isotopes were absorbed.

Figure 17: The total activity measured included sulfur 35, sodium 22 and bromine 82. When a thin shield was interposed between the fiber and the counting tube, sulfur 35 activity was prevented from reaching the detector tube. Hence, the sulfur 35 activity was obtained by difference. Since the bromine has a short half life, the sodium radioactivity is all that remains after storage of the fiber samples for a couple of weeks. In this manner, the rate and amount of adsorption of both sodium and bromide ions and the anthraquinone dye were accurately measured. They found that in 2 hours the bromide ion on the fiber exceeded the dye, but that in 20 hours the dye had replaced the bromide to a great extent and had exceeded it in amount on the fiber.

The mechanism of surface-active agents in the dyeing process is another timely problem. This deserves special attention in connection with synthetic fibers. The cuprous-ion dyeing procedures for acrylic fibers might appropriately be studied with readily available radioactive copper 64.

As I mentioned earlier, almost nothing has been done with radioisotopes in the textile field. The possibilities are certainly unlimited. Radioactivity is no miracle worker, but it is a versatile and sensitive technique. Like any such method it depends on experienced hands for its use.

CONCLUSION

In this all-too-brief presentation I have tried to emphasize the breadth of possibilities in this field and that an honest evaluation of the future of radioactivity is worthy of your full attention. I have left the burden of any real teaching on this subject to the literature. The bibliography accompanying this discussion has material in it for both management and laboratory men. The rest is up to you.

The petroleum industry has unquestionably led the way in demonstrating how radioisotopes can be used industrially. Tracers are used in oil-well exploration; in measuring the circulation time of the catalyst in refinery cracking plants; to follow the fluid interface between dissimilar fluids being pumped through a cross-country pipeline; to evaluate motor oils in engines containing radioactive piston rings; and, finally, tracers are used in conventional research both on a pilot-plant and laboratory scale.

It is the Committee's hope that we can assist those of you who are interested in this subject and perhaps co-ordinate some of the enthusiasms that result. Since I am associated with the Commission's radioisotope distribution program, I invite you to write us concerning your interests.

PROCUREMENT OF RADIOISOTOPES —— Radioisotopes are produced, sold and shipped by a prime contractor of the Commission to both individual customers and secondary suppliers. Since isotopes are made available by the Commission in accordance with the Atomic Energy Act of 1946, these materials must be distributed in such a way as to promote their safe use. An investigator must apply to the Isotopes Division outlining his facilities, experience, and radioisotope needs. Upon approval of his request he receives an authorization which permits him to purchase and use the radioisotopes. The Isotopes Division also maintains an Advisory Field Service Branch, which visits

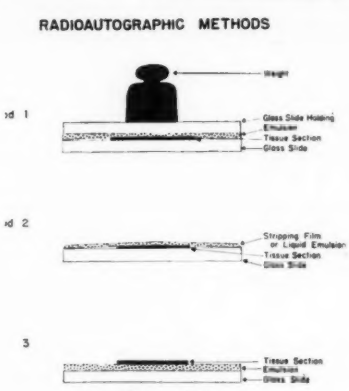

Figure 16

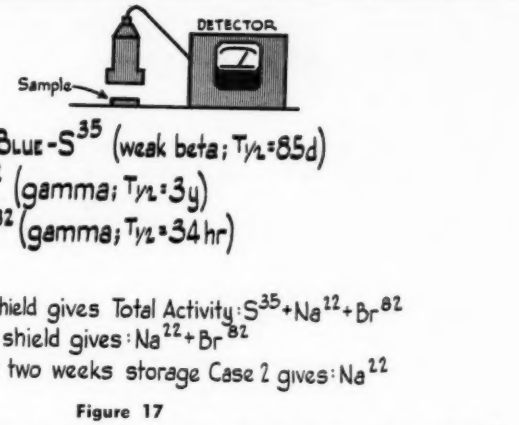
DETECTOR
Sample
ANTHRAQUINONE BLUE-S35 (weak beta; T½=85d)
SODIUM-Na22 (gamma; T½=3y)
BROMIDE-Br82 (gamma; T½=34hr)
Case 1: No shield gives Total Activity: S35+Na22+Br82
Case 2: Thin shield gives: Na22+Br82
Case 3: After two weeks storage Case 2 gives: Na22

Figure 17

both new and old users to assist them in matters pertaining to health and safety in radioisotope operations.

In closing, I would like to say that it is quite difficult for a small Committee such as this to carry its message *effectively* to *all* of the various other committees of the Association. I have had similar experience as a member of the ASTM Committee on Radioisotopes. I should therefore like to encourage other committees, as well as individuals, to come to us in the same spirit that we shall often go directly to them—to discuss mutual problems and their solution.

This is admittedly an interim report on our part and future benefits will depend on your interests.

The Committee has suggested that each year a critical summary of all radioisotope applications in the textile field be prepared for the Association. In the past four or five years this has certainly been a simple and all-too-brief task. Let's hope the future changes this picture.

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(19) "Health Physics Insurance Seminar", Technical Information Service, Oak Ridge, Tennessee, TID-388, March 12, 1952.

(20) "Maximum Permissible Amounts of Radioisotopes in the Human Body and Maximum Permissible Concentrations in Air and Water", Cat No C 13.11:52, $0.20, Supt of Documents, Govt Ptg Office, Washington 25, D C.

(21) *Training Films on Radioactivity*
The following 16-mm sound films may be obtained on a loan basis by writing the Central Film Library of the Army Area in your district, Attention: Surgeon.

1. "Fundamentals of Radioactivity"
2. "Properties of Radiation"
3. "Practical Procedures of Measurement"
4. "Methodology"
5. "Principles of Radiological Safety"
6. "Practice of Radiological Safety"
13. "Agricultural Research"

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association. Lowell Textile Institute. Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

53-16

Education: M A, Chemistry; Statistics.
Experience: textile research chemist.
Age: 41; single references; position in research or sales service desired, detergents or textile processing.
7-20, 8-17

53-18

Education: chemistry and dyeing, night classes; and business administration.
Experience: textile laboratory technician.
Age: 25; married; references; position as assistant dyer or laboratory technician desired, southern New England or California.
8-17, 8-31

Utica Technical Institute Student Chapter Officers

OFFICERS of the Utica Technical Institute Student Chapter for the coming school year are as follows:

Chairman—Louis Berman

Vice Chairman—Ronnie Shapow

Secretary—Francis V Pappalardo

Treasurer—Melvyn Rothman

1952 Annual Convention——

CONTINUOUS DYEING METHODS WITH SPECIAL REFERENCE TO SYNTHETICS*

PANEL DISCUSSION

INTRODUCTION

ROBERT D ROBINSON, Panel Chairman: I wish to extend to all of you a cordial welcome to Boston and particularly to this Friday afternoon session of the AATCC, with its theme, "America Advances through Creative Chemistry."

The first portion of our program is a panel discussion on "Continuous Dyeing." We hope by its presentation that we all will be better informed on the various methods, and what can be accomplished by them.

The panel is divided into three groups, the first of which will present a general review of the subject. This part of the panel is made up of gentlemen from American Cyanamid Company, Calco Chemical Division of Bound Brook, New Jersey, who are well experienced with the methods that they will discuss.

1. PAD STEAM——Ormond W Clark, a technical field representative with previous experience as chemist, dyer, and development engineer with several concerns.
2. THERMOSOL——Stanley Grand, a research chemist in the Application Research Department, where he is specializing in the physical chemistry and application of vat dyes.
3. WILLIAMS and HOT-OIL——Stephen J Luscian, a textile field service representative who, after teaching chemistry and dyeing at Bradford Durfee Technical Institute, gained considerable experience in industry on bleaching, dyeing, and finishing.
4. MOLTEN METAL——Charles F Turner, a former instructor of chemistry at Lafayette College, who joined the Application Research Department at Calco, where he has been investigating continuous dyeing, particularly molten-metal dyeing.
5. HIGH-TEMPERATURE DYEING —— Charles L Zimmerman, a former plant chemist of wide experience before joining the Calco Application Research Department. He has written a number of papers on dye application and done considerable work on continuous high-temperature dyeing, being a co-author of the first papers on the subject.

The second panel is made up of men experienced in these methods who, by answering "set" questions, will give a working comparison between these processes under the heading, "Development and Promotion."

1. PAD STEAM——Edward H Gamble of the Providence, R I, office of Du Pont has spent the last thirty-three years with them as a demonstrator, particularly in the field of continuous dyeing.
2. THERMOSOL——Paul Knapp (whose name is not in your printed program) is also with Du Pont, but from the Wilmington, Delaware laboratory, where he is senior research chemist. His thirty-two years in synthetic-fiber development has included, in the last few years, work on the new hydrophobic fibers, particularly Dacron and the dyeing of it.
3. WILLIAMS and HOT-OIL——Donald Marnon, assistant to the technical director of General Dyestuff Corporation of New York. He has had wide experience as a research chemist on the physical state of dyes and pigments and is the inventor of the Marhen Process for controlled vat and sulfur dyeings.
4. MOLTEN METAL——James H Murray, who has had considerable experience as chemist and dyer, specializing in continuous dyeing. After spending some time at Standfast in Lancaster, England, he returned to supervise the erection and operation of the molten-metal machine at Consolidated Bleaching Company.
5. BOND MACHINE——Boyce C Bond, inventor of the Bond Machine, the newest development in continuous dyeing. Mr Bond is sales supervisor of Pittsburgh Coke Company, Fine Chemicals Division, Villanova, Pennsylvania, and a charter member of the AATCC.
6. HIGH TEMPERATURE DYEING——Robert D Robinson, whose experience covers flavors, odors, medicinals, and, of course, textiles. For the past fourteen years, as chief chemist of Bachmann Uxbridge Worsted Corporation, I have been directing the work of chemical research and plant control, inventing Bachmann Uxbridge Easy-Rid Textile Chalk, Uxbridge Control Spray and other products. Direction of our program in continuous high-temperature dyeing is also included in my duties. Since I have been working in this field since its inception in 1938 and have been an author of papers on this subject, besides others, I suppose I may call myself a pioneer in high-temperature dyeing.

The third panel, which will discuss "Industrial Production," is composed of two men experienced in three of the above methods well beyond the development stage.

1. PAD STEAM——Hazel J Whittle, who has over twenty years' experience in plant operation, going from laboratory worker to dyer to assistant, and then to superintendent. When with Gregg Dyeing Company, he had the experience of being in the first plant in the South to dye vats continuously. He is now Superintendent of Fairforest Company, Spartanburg, South Carolina.

* Held at the Hotel Statler in Boston on Friday afternoon, Nov 7, 1952.

2. WILLIAMS and HOT-OIL——Max Housch, who has also had wide experience in continuous dyeing, first in the laboratory and then as superintendent of dyeing. He has been with several companies, broadening his experience. As superintendent of dyeing of Grace Bleachery of the Springs Cotton Mills of Lancaster, South Carolina, he is well qualified.

On display are fabrics dyed by these continuous methods, including the newer synthetics. Some of these samples have not been dyed continuously, but may well be in the near future. I have on one of our suits of a 50-50 Orlon-worsted blend, socks of Vicara and nylon, a tie of Dacron, a shirt of cotton, a handkerchief of silk, and a vest of Cyanamid's X-51 and worsted. Other synthetics I might be using would include dynel, Acrilan, or more dyeable synthetics now emerging from test tubes. The blending of synthetics with wool is proving to have interesting results.

Being a member of the panel, it is a pleasure to turn the discussion part of the program over to George L Royer, Director of Analytical Chemistry at Calco. He is a specialist, as most of you know, in chemical microscopy, microchemistry, and spectrophotometry, particularly relative to dye application. He has presented many papers here and in England and is also an author of many publications. He is the 1950 Olney Medalist, a reward given in recognition of outstanding contributions to the field of textile chemistry.

George L Royer: The purpose of this symposium is to acquaint you with various continuous dyeing processes. It will include the history, the operation, the advantages and disadvantages which are inherent in each of the different methods. Our speakers and panel members have all had experience with one or more of the different methods, either in the field of research, development, or dye-plant operation. It is their purpose to give you the information that you desire, regardless of whether you are an expert on some of the processes or whether you are a novice. In any case, we hope that you will get what you want from the symposium.

The panel members have asked me to make it clear that, while they have had considerable experience in different phases of continuous dyeing, they do not know all of the answers. They are experts today only by virtue of the fact that they are on this platform and are away from home. Each man has been asked to cover a specific subject on which he has had experience, but it should be understood that many of our panel members are well informed on other methods as well. Their assignment of subject may be considered purely coincidental and not necessarily related to any expert living or dead.

I. A GENERAL VIEW OF CONTINUOUS DYEING METHODS

PAD-STEAM PROCESS

O W CLARK, Calco Chemical Division

AN EARLY forerunner of the present pad-steam process came into use in Germany and Austria before World War II and uses the Electrofixierer, invented by Anbauer and manufactured by Benno Schilde Maschinenfabrik. Cloth is padded through either a water or a vat-acid dispersion of vat dyes, and then, either with or without intermediate drying, is padded through a solution of caustic soda and sodium hydrosulfite. The wet but squeezed material then enters the Electrofixierer for reduction and fixation of dye. At the start of a run, steam is injected into the Electrofixierer, but during the run the steam supply is decreased or entirely cut off, and the steam atmosphere is then maintained by the moisture carried in by the cloth. To furnish sufficient moisture, the cloth must carry in 100% or more of its own weight of liquid. Heat is supplied by electrical heating plates, between which the cloth passes.

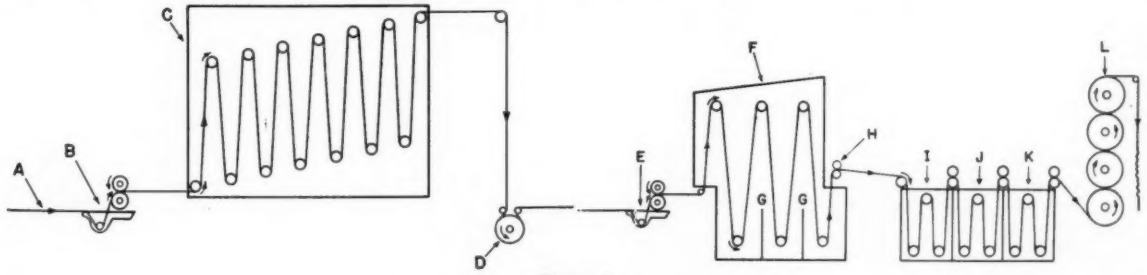

Figure 1
Schematic diagram of a typical pad-steam range

A—entering cloth
B—pigment padder
C—hot-flue drier
D—cooling can
E—chemical padder
F—steam chamber
G—baffles
H—exit nip
I, J, K—rinsing, oxidizing and soaping range
L—dry cans

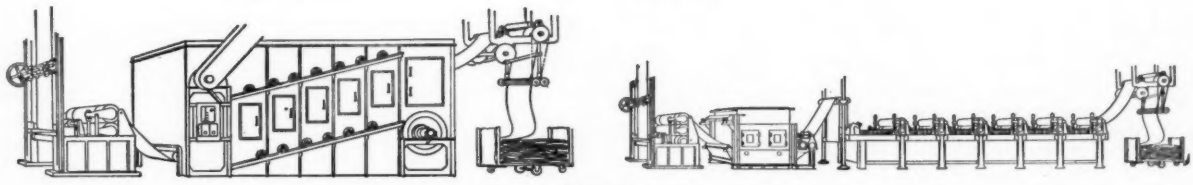

Figure 2
Typical pad-steam range (schematic)

Figure 3
Complete pad-steam dyeing range from entering end

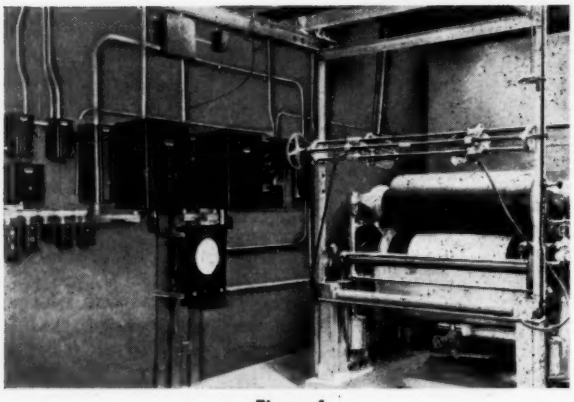

Figure 4
Two-roll padder

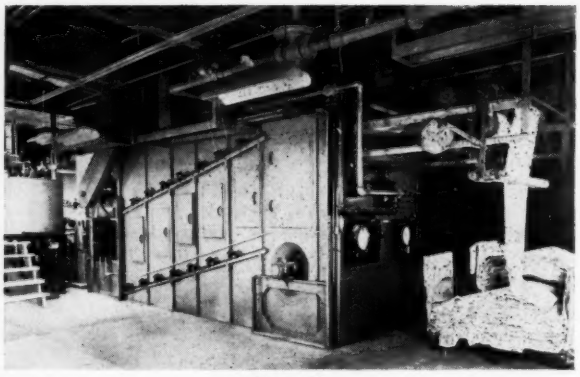

Figure 5
Drier

Another step in the development of the pad-steam process is the pad-steam range manufactured in the 1930's by Zittauer Maschinenfabrik. It consists of a pigment padder, a hot flue dryer, a chemical padder, a small steamer, and an open washing range and thus is a close prototype of present U S pad-steam ranges. In this steamer, steam jets within the steamer operate continuously and provide adequate heat and moisture so that the liquid content of the entering cloth need be only 60 to 80%.

Further development by certain American dye houses and by Du Pont adapted the pad-steam process to American operating requirements.

Figure 1 illustrates schematically a typical pad-steam range including a pigment padder (B), a hot-flue dryer (C), a cooling can (D), the chemical padder (E), the steam chamber (F), the rinsing, oxidizing, and soaping range (I, J, K) and the dry cans (L). Figure 2 represents a Butterworth pad-steam range, and Figure 3 is an actual picture of a complete plant installation. Figures 4, 5, 6, and 7 are photographs of some of the individual units included in the pad-steam range.

In the most widely used procedure, cloth is padded through a dispersion of the vat-pigment or the vat acid, dried on cans or in a hot flue, cooled by air blast or by a cooling can, padded through

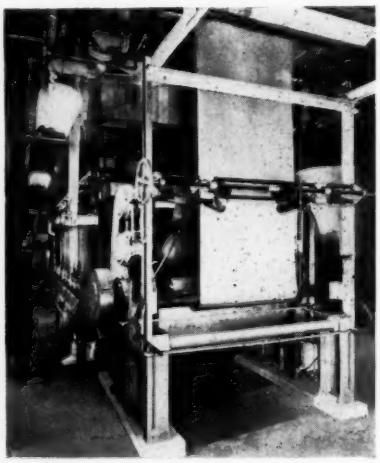

Figure 6
Three-roll chemical padder in front of steamer

a solution of caustic soda and sodium hydrosulfite at 90°F, and then passed through the steamer, where it is subjected to a saturated steam atmosphere at 214 to 220°F for 10 to 20 seconds and where complete reduction and fixation of dye occurs. The cloth leaving the steamer passes through suitable equipment for rinsing, oxidation, and aftertreatment of the dyed shade.

The advantages of the pad-steam method lie mainly in two factors. The cloth is impregnated with dye and with chemicals under such conditions that very little actual reduction and dyeing occurs in contact with large-volume liquid baths. Then reduction and fixation occur with extreme rapidity in a steam atmosphere and in a liquor ratio which is less than 1:1. This virtually eliminates difficulties caused by leuco instability or by formulations containing several dyes with different affinity, and excellent uniformity of shade is produced throughout the entire dyed yardage.

A popular variation from the above pad-steam procedure omits the intermediate drying between the pigment-padder and the chemical-padder. Another variation omits both the pigment padder and the dryer, the cloth being padded through the reduced vat dye and then immediately entering the steamer where the dyeing process continues. Still another variation of rather restricted value uses small booster baths in the bottom of the steamer.

It is imperative that cloth to be dyed by a pad-steam procedure should be uniformly absorbent, that the padding equipment should distribute the vat pigment evenly throughout the fabric, and that the intermediate drying equipment should not cause migration of the pigment-padded dye. Correctly designed padder troughs, skillful placement of foam guards, level and temperature controls, correct formulation of padder baths and the use of strainers contribute to successful padder operation.

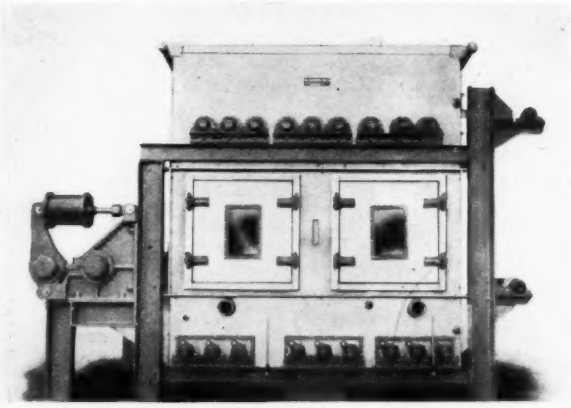

Figure 7
Steamer (side view)

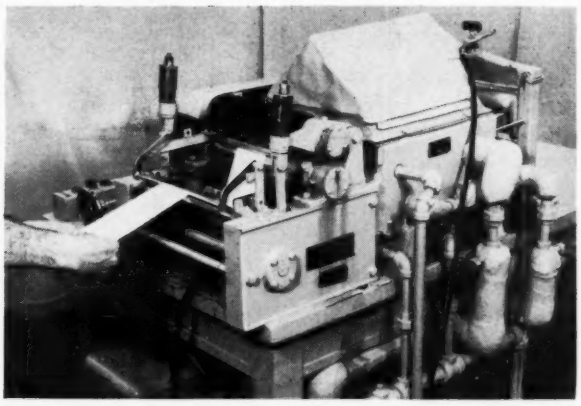

Figure 8
Calco laboratory pad-steamer

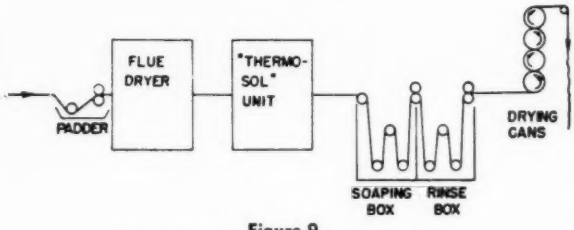

Figure 9
Schematic diagram of a Thermosol range

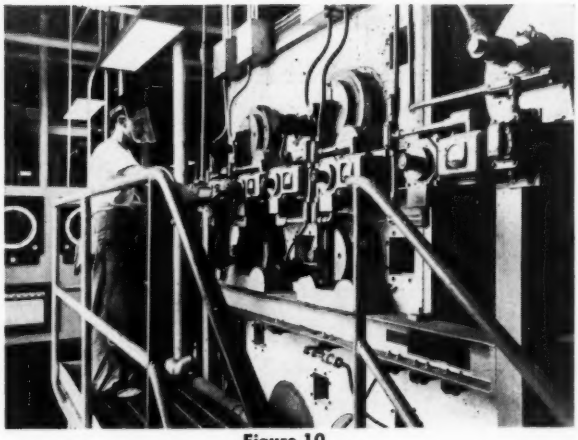

Figure 10
Thermosol machine

Hot-flue dryers must be expertly designed, carefully maintained, and skillfully operated. Steamers must be designed to eliminate water splashes, scum accumulations and condensate drops.

Sulfur dyes are readily applied by padding cloth through a solution of sulfur color and running the cloth directly into the steamer. Other classes of dyes are also applied to suitable materials by appropriate utilization of the various elements of the pad-steam range.

Laboratory work correlates quite well with mill work. Figure 8 shows the simple equipment used at Calco for pad-steam dyeing.

* * * * *

"THERMOSOL" PROCESS

STANLEY GRAND, Calco Chem Div

Since the introduction of the new synthetic fibers, a great deal of effort has been expended in attempts to develop satisfactory methods for dyeing these fibers. Most of the methods which have been suggested involve the use of relatively high temperatures, 200°F or higher, in order to increase the rate of diffusion of dye into fiber. One example of a high-temperature dyeing method is the Thermosol, or dry-heat process, which was introduced by the Du Pont Company a few years back, and which has been found very useful in the dyeing of Dacron polyester fiber and nylon. This method is reported to give deep shades of excellent fastness and good color yield on Dacron and on nylon but is generally unsatisfactory for dyeing Orlon acrylic fiber, since color yields of less than 50% are usually obtained. Good results have been obtained by the Thermosol process with selected acetate and vat dyes on Dacron and with selected acetate, direct, and acid dyes on nylon.

In the Thermosol process a surface coating of dye is applied to the fiber, which can be in the form of loose staple, tow, top or fabric. The dye is usually applied from an aqueous dispersion or solution, so that the next step is drying to remove the water. After drying, the fibers are heated to a temperature around 400°F and are maintained at that temperature for a short time, usually less than two minutes. This heat treatment is followed by a scour to remove any assistants used in the surface-coating operation and to remove unfixed surface color. Thus, the Thermosol process involves three well-known operations: surface coating, drying, and heat setting. A schematic representation of a continuous Thermosol fabric dyeing range is shown in Figure 9.

The preparation of the fabric is extremely important in this process. The presence of any foreign matter in the cloth which will prevent smooth, level padding must be avoided, since there is no opportunity for leveling during the subsequent heating operation. After the fabric has been properly scoured and dried, it is ready to be padded. As usual, the preparation of the padding dispersion is extremely important. Besides the use of colors which give very fine dispersions and no specking, it is necessary, because of the hydrophobic nature of these fibers, to include a thickening agent, which helps hold the dye particles on the fabric, and a moderately volatile organic solvent to produce even spreading of the pigment particles on the fabric surface. A typical formula used on Dacron-filament fabric included 3-4% by weight of a low-viscosity, salt-free CMC and 20% by volume of Cellosolve.

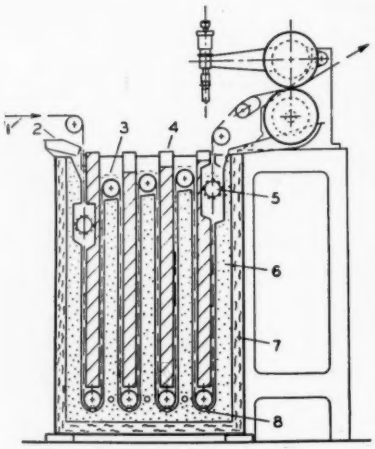

Figure 11
Cross-section of Williams Unit

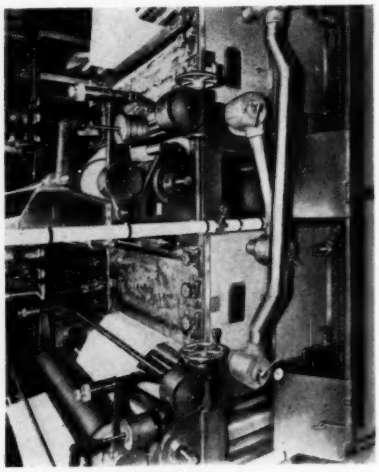

Figure 13
Plant installation showing two Williams Units

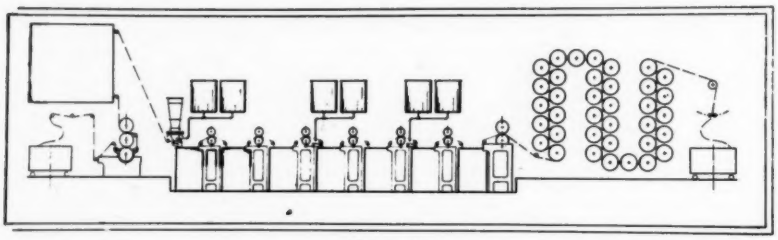

Figure 12
Schematic diagram of a range with Williams Units

As is usually the case in pigment padding, drying must be accomplished by uniform application of heat to prevent migration of the dye on the surface of the fabric. A flue dryer has been found satisfactory for this stage of the process.

After drying, the fabric is subjected to the heat-setting treatment. The apparatus used in this operation must be capable of heating the fabric to temperatures around 400°F and of maintaining this temperature for a short time. Any textile equipment that can maintain temperatures in the 360-480°F range should be suitable. The unit designed by the Du Pont Company for their investigations at the Newport Textile Laboratory is a hot-roll machine shown in Figure 10. Typical exposure time for a 3-oz Dacron-filament fabric in this machine is 30 seconds at 370°F. Hot-air machines require longer exposures at higher temperatures, e g, one minute at 400° F, for the same fabric.

In an Intersectional Contest Paper prepared by the Rhode Island Section of this association (*1*), it was reported that vat dyes could be applied to Dacron fabrics by a modification of the Thermosol process. The best results were obtained by padding the fabric with the reduced vat solution, drying, exposing to air at 430°F for 1-2 minutes, padding again with caustic and hydrosulfite, steaming for about 20 seconds, and soaping. In this way dyeings of good fastness to washing and light, but with poor crocking fastness, were obtained. It was found that a light stripping treatment, e g, 5-10 minutes at 120°F in a solution containing 1% NaOH and 1.5% hydrosulfite, gave greatly improved fastness to crocking.

It has also been found possible to dye Dacron with combinations of vat and acetate colors by the Thermosol process. Since selected acetate colors exhibit excellent fastness on Dacron, it is possible through these combinations to obtain a range of shades having excellent fastness to light and washing.

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(1) E H Gamble et al, *Am Dyestuff Reptr* 41, 223 (1952).

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CONVENTIONAL WILLIAMS UNIT AND HOT-OIL DYEING PROCESSES

S J LUSCIAN, Calco Chemical Div

The original idea for the Williams unit grew out of a desire for a machine capable of dyeing vat colors by a continuous process. In order to make such a machine economically feasible it was necessary to use temperatures near the boil and small-volume dyebaths. The use of high temperature decreases the time of dyeing considerably and makes possible high-speed continuous operation. A small-volume dyebath is desirable in order to keep down chemical and dyestuff costs.

Figure 11 shows a cross section of a Williams unit. It is seen that much of the volume of the unit is taken up by a series of baffles, and that the cloth travels up and down between these baffles. Thus it is possible to maintain a relatively large amount of cloth in the unit although the volume of the dyebath is relatively small. In addition, the top guide rollers are kept below the surface of the bath so that the cloth is not exposed to air oxidation during the dyeing.

A typical plant layout for the continuous dyeing of vat colors in Williams units is

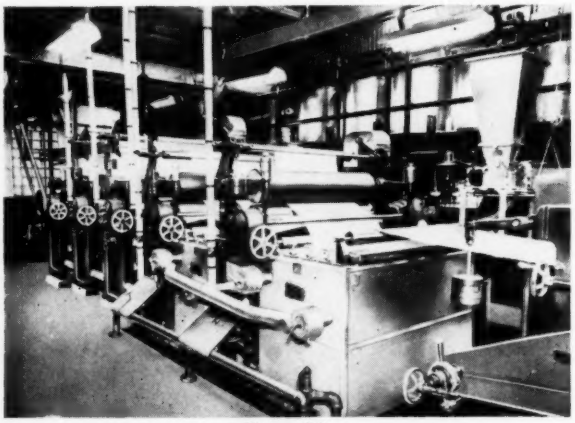

Figure 14
Williams Unit Dyeing range

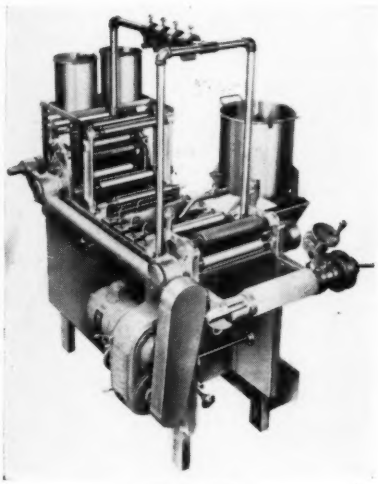

Figure 15
Laboratory Williams Unit

Figure 16
Calco laboratory dyeing apparatus including V box and 3-roll padder

shown schematically in Figure 12. Included are a padder, a hot-flue dryer, and two Williams units. After the second Williams unit a conventional washing range and dryer may be used. This type of layout serves for conventional aqueous Williams-unit dyeing and also for hot-oil dyeing. For hot-oil dyeing the newer high-pressure Williams units are preferred. Figure 13 shows two Williams units set up for operation and Figure 14 shows a range containing five Williams units.

There are several methods commonly used for applying vat colors on Williams units. Consider first the aqueous methods:

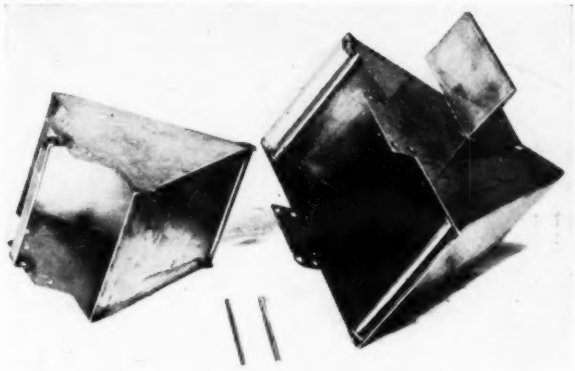

Figure 17
Calco laboratory V box

1. REDUCED-PAD METHOD——The cloth is padded with a solution of the reduced vat dyestuff and entered directly into the Williams unit, which contains caustic soda, sodium hydrosulfite, and enough booster dye to compensate for bleed-off from the padded cloth. Reduction and dyeing are completed in the Williams unit, and then the cloth is oxidized and soaped.

2. PIGMENT-PAD AND DRY METHOD——The cloth is pigment-padded with a dispersion of the vat color and then dried in the hot-flue dryer. The dried cloth is entered into the Williams unit containing caustic, hydro, and booster dye for completion of the dyeing.

3. PIGMENT-PAD, WET METHOD——The cloth is pigment-padded and entered directly into the Williams unit without intermediate dying. In general, better penetration is obtained when the cloth is dried after pigment padding.

In reviewing these aqueous processes it is noted that in each case the Williams unit contains booster dye. The uniformity of shade obtained by this process depends upon careful formulation of the development-bath starting composition and of the feeds added during the run.

The three methods just outlined, i e, the reduced-pad, pigment-pad and dry, and the pigment-pad, wet procedures, are all applicable in hot-oil dyeing. The cloth can be padded with reduced color and entered directly into the hot-oil unit, where reduction and dyeing are completed. Alternatively, the cloth can be pigment-padded, dried or not as desired, saturated with caustic soda and hydrosulfite with a padder or a Williams unit and then entered into the hot-oil unit. The cloth is immersed in the oil for a short time, usually less than 30 seconds. Since the oil is kept at 220-230°F, only a very short time is required. After leaving the oil unit the cloth must

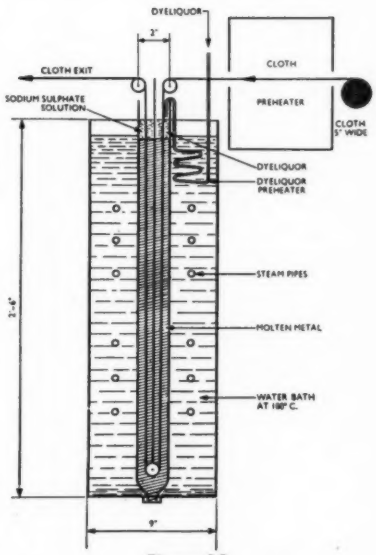

Figure 18
Cross-section of Standfast laboratory molten-metal machine

be rinsed thoroughly with a dilute solution of an emulsifying agent, such as Igepal CA. In addition, this emulsifying agent is usually added to the oxidizing and soaping baths. In this way it has been possible to remove most of the oil and to leave in the cloth only about 0.5% of oil on weight of fabrics (owf).

The Williams unit can be used for applying sulfur colors in the same ways it is used for dyeing vats. The most common method for dyeing sulfur colors is to pad the cloth with a hot solution of dye prepared with sodium sulfide and soda ash. The wet cloth is entered into the Williams unit directly after padding. The unit can be used as a booster bath containing a solution of dye, sulfide, and soda ash, or it can be filled with hot-oil. In either case dyeing is accomplished in the unit, and the cloth is then rinsed and soaped as usual.

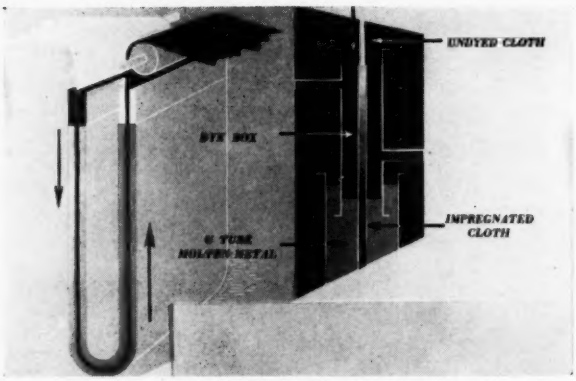

Figure 19
Schematic diagram of molten-metal machine

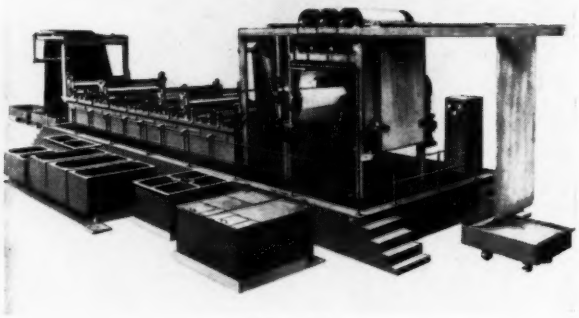

Figure 20
Plant installation of Standfast molten-metal machine

A laboratory Williams unit is available for shade matching and other applications. Figure 15 shows the General Dyestuff standard laboratory Williams unit. Figure 16 shows a Calco-built continuous dyeing apparatus which was used to investigate the aqueous Williams unit process. The apparatus consists of a 3-roll padder and a V box, which we have used to simulate the Williams unit. Figure 17 shows this V box and its component parts. The simple principle of the V box is that, when the smaller section is inserted into the larger one and held in place by the rods shown, there is a narrow channel between the two sections. The cloth moves in this narrow channel, which contains the dyebath. The smaller unit is filled with water or some other liquid and is equipped with a stirrer and an electrical heater. This electrical heating is the only heating necessary.

Using this simple laboratory set-up we have been able to investigate many phases of the aqueous Williams-unit vat-dyeing process. We have studied the effect of varying the immersion time in the bath, the temperature in the bath, and the amounts of caustic, hydro, and booster dye in the bath. An extensive study was made of the equilibrium between the padded cloth and the dye in the bath, and the booster dye required in applying various vat colors by this method was determined. (The results showed that the amount of booster dye required varies considerably from dye to dye, and also that large quantities of common salt in the bath decreased the bleed-off considerably.) The laboratory V box is also used for matching shades with vat and sulfur colors.

A similar laboratory apparatus was designed in order to study the hot-oil process. It was found advantageous to eliminate the inner V box in the hot-oil studies. By using only the one chamber filled with oil and equipped with an electrical heater it was possible to maintain temperature control easily and to eliminate most of the difficulty arising from foaming of the oil bath. With this apparatus we have studied the application of vat and sulfur colors by the hot-oil method. The effects of varying the caustic and hydro concentrations in the chemical pad, the percentage wet pickup from the chemical pad, the immersion time, and the temperature of the oil bath were studied.

Figure 21
Calco laboratory molten-metal machine

* * * * *

MOLTEN-METAL DYEING

C F TURNER, Calco Chemical Division

Molten metal as a heat-treating medium has been in use for many years. German workers are reputed to have been experimenting with mercury as early as the latter part of the nineteenth century. While two Englishmen, Mather and Hepburn, were conducting experiments along these lines in 1903, some Frenchmen were also at work on the same basic ideas. However, the first notable success with this method of continuous application for vat dyes was achieved by the Englishmen, Hannay and Kilby. Oddly enough, they were not studying dyeing problems at all but were investigating the use of molten metal in the curing of textile resins when its value in vat dyeing was realized.

Although much has been written on the molten-metal, or Standfast Process, it might be well to review here its basic principles. Fundamentally, the process uses a fused metal alloy of relatively high density as a medium for the heating of a transient fabric. metal most often used is an alloy known as Wood's metal. This alloy contains 50% bismuth, 25% lead, 12½% cadmium and 12½% tin. The eutectic normally melts at about 65°C and has a density of about 10. In a normal Standfast dyeing operation the dye liquor floats on top of the entrance to the molten metal bath as illustrated in Figure 18. This dyebath is separated from a floating salt exit bath by a stainless-steel wall. This wall is in the laboratory model only. The production model has a U tube for the metal (Figure 19). A typical plant installation is shown in Figure 20.

Let us consider a specific laboratory model for a moment. Figure 21 shows the Calco laboratory machine, the major portion of which is the standard machine made by Rodney Hunt and in principle duplicates the Standfast laboratory machine. In this model the heating is done electrically with strip heaters, which are Variac controlled. Preheating of the cloth being processed is done by a strip heater (see Figure 22). The motive force to carry the fabric through the metal comes from the nip. Cloth speed is controlled by means of a U S Varidrive unit, which normally provides immersion times ranging from 1 to 8 seconds. An auxiliary reduction gear box may be added to provide a wider range of cloth speeds. With this reduction gearing, immersion times may be increased to 2 minutes. The metal-bath temperature

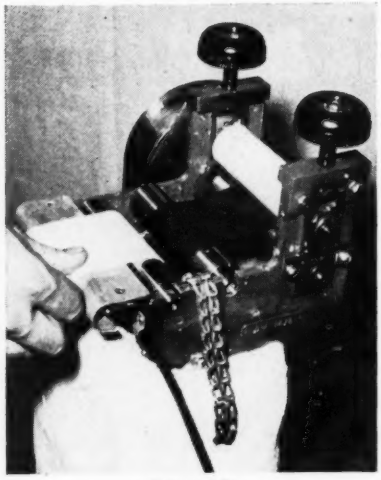

Figure 22
Top view of Calco laboratory molten-metal machine

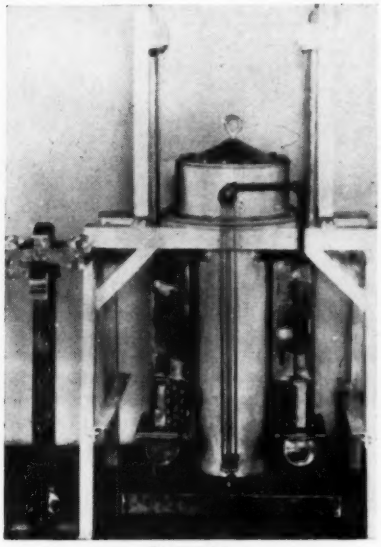

Figure 23
Mercury-sealed high-pressure dyeing machine

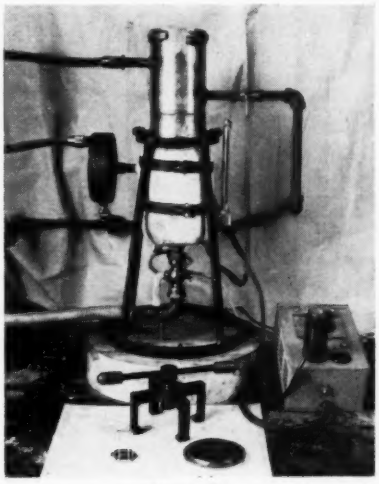

Figure 24
Calco laboratory noncontinuous high-temperature dyeing machine

is usually held at 90-95°C (194-203°F). It has been run as high as 200°C (432°F) but not with water solutions.

The cloth to be dyed passes over the preheater, over a roller, down through the dyebath and then down into the molten metal. This laboratory model has a column of molten metal 2 feet high, while the column in the mill model is 5 feet high. In the laboratory model the cloth passes downward through the metal around a roller and continues up through the metal, into the salt exit bath and out through the nip to be oxidized, soaped and rinsed as needed. The cloth immersion times in the metal on the production model vary from 6.7 seconds at 30 yards per minute to 1.6 seconds at 120 yards per minute.

Most of the work which has been done to date has been concerned with vats. Either pigment-pad or leuco-pad systems work well, but, as would be expected, the pigment-pad method gives far superior penetration. One advantage of the Standfast Process appears in the smaller amount of caustic soda and hydrosulfite needed as compared with pad-steam. This will vary with the specific dye, but ½ to ¾ as much seems to be a good average. Another advantage of this method is the speed with which the machine can be cleaned. On actual measurement the time required to change from a dark to a light shade runs from 5 to 10 minutes. At the present time, however, the chief disadvantage of the process is that it is difficult to obtain good penetration.

The field of dyeing direct and acid dyes by this method is relatively unexplored. Work at Calco on the laboratory machine seems to indicate that it is possible to dye these types in the molten metal but it is not so simple as vat dyeing. Applying directs or acids to the cloth is simple enough, but to obtain satisfactory penetration, crock and bleed is a more difficult problem. Metal pickup seems to be greater with direct dyes than with vats, but this can be overcome to some extent by pH control of the exit bath. With direct dyes there is a definite tendency for the dye to discharge or reduce in the metal, so that the longer the dyed cloth is immersed in the metal, the lighter the shade.

Sulfur dyes are very difficult to use with this system. This is due to the tendency of the cadmium to form its sulfide, which appears as a heavy scum and destroys the dyeing. The cadmium is present, as mentioned above, in the alloy. Leaving the cadmium out of the alloy would solve this problem but causes another. Without cadmium the alloy of bismuth, tin and lead melts at 95°C (204°F) instead of 65°C (146°F), so that even at the normal boiling point of the dyebath the metal is too viscous. We understand, however, that Standfast feels it may have this problem conquered, and they are now underway with this phase.

The molten-metal process is also applicable to flash-aging vat prints but as yet not at the high speeds to be expected in dyeing. It becomes essentially the Colloresine process with its prepad and nip. At Calco we have also had a measure of success with the developing solution floating on top of the metal.

Let me close by answering a question that seems to plague most people who are not too familiar with the process. How about metal pickup and its discharge from the bath? The answer is that it can be kept to a negligible amount by proper handling, but this includes mechanical as well as chemical means and varies considerably from fabric to fabric.

* * * * *

CONTINUOUS DYEING AT ELEVATED TEMPERATURES

CHARLES L ZIMMERMAN, Calco Chem Div

In 1938 Harold J Walter (6), president of the Bachmann Uxbridge Worsted Corporation, had the idea that, if cloth could be dyed at temperatures well above the normal boiling point of water (212°F), a better-penetrated cloth and a more rapid dyeing method might result. If the rate of diffusion of dye into wool was increased sufficiently by these high temperatures, a continuous dyeing process for wool would be possible. In order to explore this novel idea, Robert D Robinson and coworkers began a laboratory study of high-temperature dyeing at Uxbridge.

The initial studies were made in an ordinary pressure cooker. Because of the fact that the wool cloth had to be in contact with the dye solution during both the heating-up and cooling-down stages of the process, there was considerable decomposition of fiber and dye in the early experiments. These experiments indicated, however, that some of these difficulties might be overcome by shorter immersion times.

In order to accomplish this, a piece of stainless-steel equipment was designed and built at Uxbridge consisting of a dye tank and two long columns filled with mercury, which acted as pressure seals (see Figure

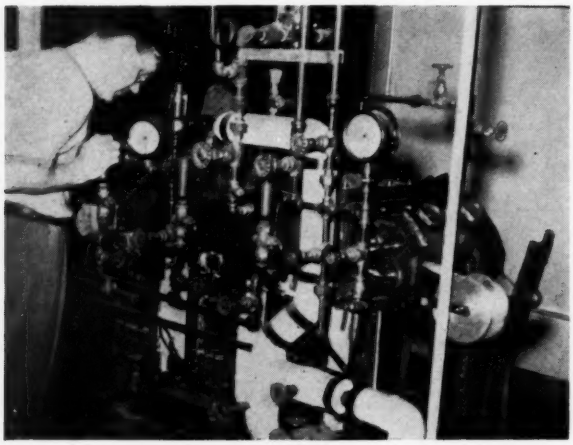

Figure 25
Calco laboratory continuous high-temperature dyeing machine

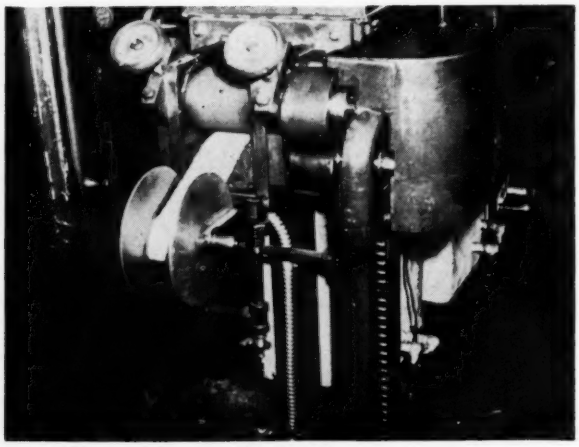

Figure 26
Sealing rolls on Calco laboratory machine

23). A piece of cloth four inches wide could be dyed continuously by passing it through one mercury column, through the heated dyebath, which was under pressure, and then out through the other mercury column. In this apparatus temperatures up to 270°F and immersion times as low as 15 seconds were used. Experiments in this equipment showed that wool could be dyed satisfactorily at elevated temperatures, provided the time of immersion was short.

After studying many of the fundamentals of high-temperature dyeing with the mercury-seal machine, a larger machine was built which would accommodate 36-inch wide fabric so that some idea of the levelness of dyeing could be ascertained. A batch process was decided upon, since mercury seals were not practical and mechanical methods of sealing were still being studied. A large pressure chamber was constructed with a door on one end through which a dye tank on wheels could be inserted. The cloth to be dyed was placed on a roll at one end of the dye tank and sewed to a leader previously threaded through the machine to the wind-up roll. The tank was filled with a dye solution and pulled into the pressure chamber, where the steam lines and driving mechanism were attached. The door was closed and the desired pressure was applied with compressed air. When the dyebath reached the desired temperature, the cloth was pulled through by the leader and rolled up at the other end. The time of immersion was controlled by the speed of the driving mechanism, and the temperature and pressure were held constant by automatic controls. After the dyeing, the bath was cooled, the pressure was released and the cloth was removed for rinsing and finishing.

The over-all results were so encouraging that a machine to run continuously and to accommodate 62-inch fabric was then contemplated. However, from the beginning of the high-temperature dyeing program it had been observed that, when dye solutions were held at elevated temperatures over periods of several hours, some dyes decomposed. Because of thermal decomposition of the dye and other dyeing problems, the Calco Chemical Division of the American Cyanamid Company was asked by the Bachmann Uxbridge Worsted Corporation in 1941 to co-operate in a study of the dyeing of textile materials at elevated temperatures.

A laboratory noncontinuous dyeing unit (*4*) was designed and built at Calco for dyeing at temperatures up to 300°F under an air pressure of 50 lb per square inch (see Figure 24). This unit is constructed so that a sample can be entered into a

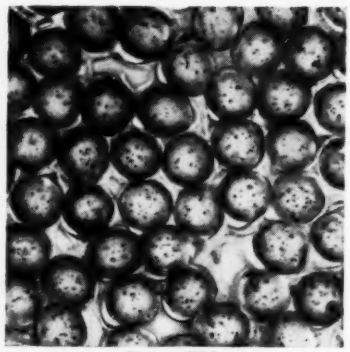

Figure 27A
Cross section of nylon dyeing—dyed 1 hour at the boil

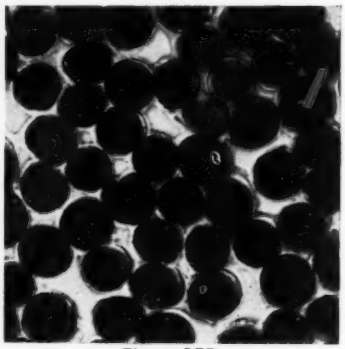

Figure 27B
Cross section of nylon dyeing—dyed 75 seconds at 275°F

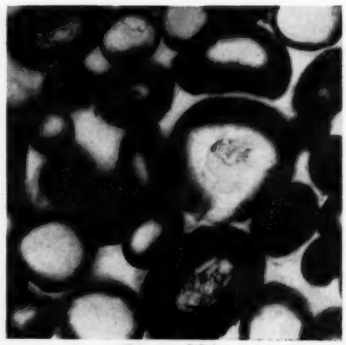

Figure 28A
Cross section of wool dyeing—dyed 2 hours at 200°F

Figure 28B
Cross section of wool dyeing—dyed 60 seconds at 275°F

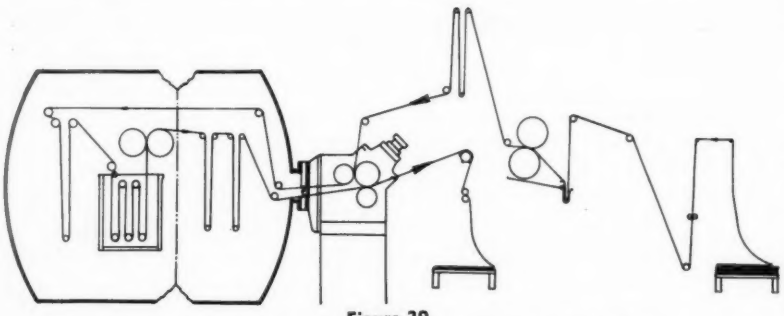

Figure 29
Schematic diagram of Uxbridge high-temperature dyeing machine

high-temperature bath without preheating or steaming and, after the desired dyeing interval, removed from the bath quickly and cooled. With this machine it is possible to dye cloth in a bath at an elevated temperature for very short immersion times and to simulate a continuous operation. Some of the fundamental studies on high-temperature dyeing made in this laboratory machine have been described in a recent publication (5).

In order to apply the results obtained in this preliminary investigation to continuous dyeing, a laboratory continuous high-temperature dyeing machine was also built at Calco. This machine, illustrated in Figure 25, consisted of a pressure chamber containing three individual baths that could be used interchangeably for dyeing or rinsing. The top and sides of the machine were made of glass so that the cloth could be seen during the dyeing. A set of sealing rolls, Figure 26, made on the Uxbridge principle was installed at both the entering and exit ends of the machine. Cloth up to four inches wide could be dyed continuously at temperatures up to 300°F and at various times of immersion.

In the course of the investigation it became apparent that there were many disadvantages in dyeing continuously from a concentrated dyebath. To overcome some of these disadvantages, a modified method was developed, which consisted of first padding the cloth with an aqueous solution of dye at normal (below 212°F) temperatures and then developing the padded cloth in an aqueous bath at elevated temperatures. Padding offered a very convenient method for controlling the shade and also a practical way for feeding dye into the machine at the desired rate.

By means of this technique, the dyeing of many types of fibers was evaluated (2). These tests showed that in general the rate of dyeing is increased and thus the time of dyeing decreased by an increase in temperature. For example, with this method nylon has been dyed continuously at 275°F during a 75-second immersion time to the same shade as that obtained in one hour at the boil. The relative penetration obtained in these dyeings is shown by the cross sections depicted in Figures 27A and 27B. Figure 27A shows the sample dyed at the boil; 27B the one dyed in 75 seconds at 275°F. Similar results on wool are illustrated in Figure 28. Only one minute was needed to obtain the same depth of shade on wool at 275°F as that requiring two hours at 200°F. These dyeings had the fastness, tensile strength and other physical characteristics equal or superior to dyeings obtained by normal procedures. In addition to wool and nylon, dyeings have been made on cotton, viscose, aralac, cellulose acetate, silk, immunized cotton, goat hair, cashmere, rabbit fur, linen, alpaca, mohair, polyacrylonitrile fibers, and polyester fibers. High-temperature dyeing shows considerable promise as a means of coloring these new synthetic fibers. Recently there have been a number of publications on the dyeing of the new synthetics at elevated temperatures, all showing great improvement in dyeing (*1 and* 3). Since these have all been batch processes, usually package-dyeing processes, they will not be discussed here.

As a result of the success obtained with these laboratory and semicommercial machines, the Bachmann-Uxbridge Worsted Corporation has constructed a 62-inch-width continuous dyeing machine. This equipment consists of two main parts, a padder and a pressure chamber for dyeing and developing. A schematic diagram of the machine is shown in Figure 29.

The padder consists of a stainless-steel immersion or pad box and two rubber rolls, each roll being 76¼ inches wide and 18 inches in diameter. Pressure is applied to the squeeze rolls by air and must be adjusted so that it is greater than the pressure on the sealing rolls.

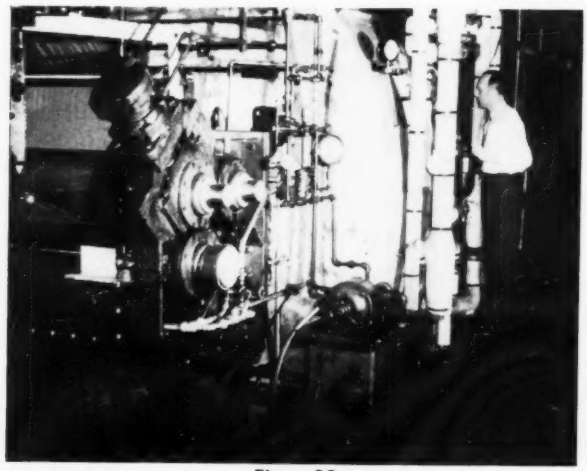

Figure 30
Entering end of Uxbridge machine showing sealing rolls

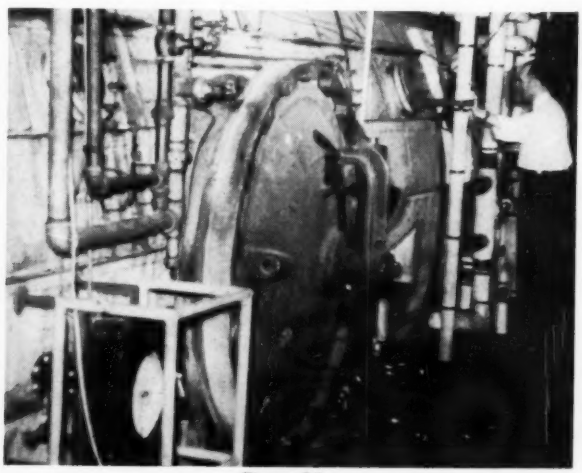

Figure 31
Side view of Uxbridge pressure chamber

After being padded, the cloth passes into the pressure chamber through a set of sealing rolls, which were designed to hold 50 lb of pressure per square inch while in motion. These sealing rolls consist of two steel rolls with a rubber roll pressed against them. Air is prevented from leaking around the sides and ends of the rolls by an elaborate set of cross seals. Figure 30 shows the entering end of the machine, and Figure 31 is a side view of the same machine.

After passing through the seal rolls the cloth enters the tank containing the developing, or dye bath, which is at an elevated temperature. The developing tank contains approximately 1500 gallons of solution and at present can accommodate open-width cloth up to 62 inches wide. The developing tank holds about 42 yards of cloth, and the immersion time can be varied by controlling the running speed. The whole machine is operated from a single panel board. On this panel are controls for varying speed, immersion time, temperature, pressure, feed pumps to padder and to the developing tank, circulation pumps, volume level, and pH.

Cloth, after being scoured and dried, passes through the pad box and squeeze rolls, where a controlled amount of dye is applied. The wet padded cloth passes over a set of speed-compensating, or dancer, rolls and then through the top nip of the sealing rolls into the pressure chamber. Then the cloth, after passage over a second set of compensating, or dancer rolls, enters the developing solution, where it is dyed in a few minutes at the elevated temperature. The dyed cloth passes through a set of squeeze rolls at the end of the developing tank, then over another set of compensating or dancer rolls and out of the pressure chamber through the lower nip of the seal rolls. The dyed cloth is then ready for rinsing and finishing.

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(6) Walter, H J, USP 2,387,200 (October 16, 1945).

II. DEVELOPMENT AND PROMOTION

In the second portion of the program the panel answered questions designed to bring out comparisons between the processes with regard to their commercial use. The panel consisted of representatives from the companies that have developed the different continuous dyeing methods. They answered the following specific questions, which were presented to them by the symposium committee:

1) What types of fibers including the newer synthetics and blends can be dyed?
2) What types of dyes can be applied?
3) How does this dyeing process compare with competitive processes in the following respect?
   A Economics
      (1) Speed
      (2) Dye Efficiency
      (3) Minimum Practical Run
   B Quality
      (1) Fastness, Rubbing, Light, Washing
      (2) Penetration
      (3) Levelness
      (4) Effect on Physical Properties

PAD-STEAM PROCESS

EDWARD H GAMBLE
E I du Pont de Nemours & Co, Inc

1) The pad-steam method is in practical use for the dyeing of fabrics consisting of the following fibers:

cotton (mercerized or unmercerized)
rayon (spun and bright)
cotton and rayon blends
rayon and acetate blends
nylon

2) The pad-steam method is used for the application of vat dyes, sulfur dyes and direct dyes on cotton, rayon, blends of cotton and rayon, and blends of rayon and acetate. This process can also be used for the application of acid and direct colors on nylon.

3) It is common practice to operate the pad-steam process at speeds of 110-120 ypm. We rarely operate this range under 75 ypm.

The dye efficiency is excellent because maximum fixation of dye is obtained.

The minimum practical run is from 4000-5000 yards.

The optimum fastness to crocking, light and washing is obtained.

The penetration obtained by the pad-steam process is excellent.

Excellent levelness is obtained by the pad-steam process, provided the material is given a reasonable preparation prior to dyeing.

The pad-steam process has no deleterious effect upon the physical properties of cotton, rayon and nylon.

* * * * *

THERMOSOL PROCESS

PAUL KNAPP
E I du Pont de Nemours & Co, Inc

1) At the present stage of development, Dacron polyester fiber is the only fiber that can be satisfactorily dyed by the Thermosol process. Other fibers such as nylon and Orlon acrylic fiber, can be colored to some extent by the process, but the color fixation is relatively poor on nylon and very poor on Orlon.

Blends with Dacron should be dyeable by the Thermosol process, the Dacron component being colored and the other components being white or lightly colored. The color picked up by the fiber components other than Dacron is lost in the scour, making the process unattractive from an economic viewpoint when applied to blends. Of course, the component of the blend other than Dacron must be able to withstand the Thermosol temperature of about 350-390°F.

2) Acetate colors are used almost entirely in the Thermosol process for Dacron. There are a few selected vat colors which can be used satisfactorily by the Thermosol process on Dacron, but most of the shades are not so bright as with acetate colors.

Acid colors are not applicable on Dacron but can be applied with poor efficiency on nylon.

3) The Thermosol process is a continuous process in which the padding and drying can be run at 40 ypm. The heating operation takes 1 to 2 minutes at about 390°F and, in the average pin-tenter, can be run at about 15 ypm, or 900 yards per hour. This rate is several times as fast as

the hourly production from a single beck or jig by the carrier method. This is around 150 yards per hour, but, considering all cost elements in these processes including materials, labor and investment, the cost per pound of fabric is about the same.

The dye efficiencies of 18 typical acetate colors on Dacron were measured by means of the spectrophotometer. The efficiency of fixation for medium shades varied from 85% of the padded color for Acetamine Orange 3R to 97% of the padded color for Latyl Violet B. In a selected group of acetate colors covering a full shade range for "Thermosol," all have values better than 90%. This compares with aqueous exhausts with carrier varying from 60% to 80%.

The minimum run in the Thermosol process is a matter of economics. A pad bath costing $100 results in a charge of 10 cents a yard if 1000 yards are run and 1 cent a yard if 10,000 yards are run when the bath is dumped at the end of each run. Of course, the smaller the bath capacity the less cost from this source.

Acetate colors for use in the Thermosol process on Dacron can be selected with good to excellent fastness properties. This selection is not difficult for rubbing fastness, because nearly all acetate dyeings from the Thermosol process have good crock fastness in medium shades. In light fastness, the individual acetate colors vary widely, but a full shade range can be selected having good to excellent light fastness of 40-320 Fade-Ometer hours. Wash fastness is generally good for selected colors.

Let me add that resistance to sublimation is of great importance in this process and a careful selection from available acetate colors is required. One of the strong points of the Thermosol method of dyeing is the high level of fastness properties.

Penetration is essentially 100% in Dacron, dyed both by the aqueous and Thermosol processes.

Levelness is a strong point of the Thermosol process. Warp streaks and some types of filling bars are considerably minimized in Thermosol dyeings. For levelness side to side, front to back and area to area, the Thermosol process requires careful fabric preparation and close attention to details in all steps.

The crease recovery of fabrics dyed by the Thermosol process is not changed significantly from the original undyed fabric. Because of shrinkage, the density and rigidity are somewhat increased; tear strength is not altered.

WILLIAMS AND HOT-OIL DYEING

DONALD E MARNON, General Dyestuff Corp

1) The Williams Unit Water Phase System is predominantly designed to process the cellulose fibers, cotton and rayon. These may or may not be bleached prior to dyeing. Blends of these fibers with synthetics may be handled, provided the percentage of synthetic is low, e g, 15% of nylon, 85% of viscose.

The Williams Unit Oil Phase System is generally restricted to cottons in those constructions which do not entrap oil readily. Corduroys and spun rayons, for example, trap excessive amounts of oil.

2) These continuous systems are generally used for applying vats and sulfur colors. A considerable yardage has been dyed with naphthols, while a smaller quantity has been dyed with direct dyes.

3) Depending on the depth of shade and fabric construction, speeds up to 150 ypm have been satisfactorily processed. For example, a navy blue (35 oz/gal pad), showed excellent fixation by the hot-oil process.

The dye efficiency of these systems compares favorably with other continuous processes. This is true particularly with the water-phase system, where the reduction potential of the actual developing bath may be measured and controlled.

The minimum practical run varies with the operation. In the New England area perhaps 1500 yards is minimum; in the South, 5000 yards.

These processing methods produce dyeings with excellent fastness to rubbing, light and washing, depending, of course, on the dyestuff itself.

If the process is modified, as it should be, to suit the particular construction, the penetration will be excellent.

It is felt that optimum levelness can only be obtained by means of an aqueous developing bath. This unit may, of course, be followed by a hot-oil unit, a steamer or a second aqueous unit for maximum fixation.

As far as we have been able to determine, neither process has any deleterious effect on the fabric processed.

* * * * *

MOLTEN-METAL PROCESS

JAMES H MURRAY, Consolidated Bleaching Co

The Standfast Molten-Metal Process has been designed primarily for the application of vat dyestuffs to cellulose fabrics. Its use for other dyestuffs and on other fibers has been limited to laboratory trials, and to a few plant-scale runs. All machines, other than those at Standfast and including the one at Consolidated Bleaching Co, have been installed in the last few months. Our own production problems have had priority over experimental runs on other dyes and fibers.

Plant-scale trials are currently underway at Standfast applying sulfur colors on a modified version of the machine with reportedly excellent results. Direct colors have been applied to cotton by the process with results that compare favorably with other continuous methods. Work on acetate and on wool has been, to the best of my knowledge, confined to laboratory trials. The use of vat dyes on these fibers is being investigated. The short dyeing time found in this process is an obvious advantage for this use. The newer synthetics offer the same problem on the Standfast machine as they do in more conventional methods. In spite of the picture that the words "molten metal" bring to mind, it is not a high-temperature process. All temperatures are below the boiling point of water on the model of the machine currently in use. The future use of molten-metal development in the dyeing of these fibers is still a question mark.

The bulk of the work has been done with vat dyes on cotton. In this case, the advantage of the machine, from the economic standpoint, lies in its ability to handle smaller yardages than are practical by other continuous methods. This is due to the greatly reduced cleaning time necessary between shades, to the small dye wastage, and to the absence of shade variations at the start of the run. The ability of the laboratory model of the machine to predict the shade obtained on the bulk machine also speeds up the handling of small lots. Standfast regularly runs lots of less than 500 yards to a shade.

The speed of operation varies between 30 and 120 yards per minute. Light to medium shades give full yields at the higher speeds. For heavy shades, we have found better yields at the lower rate.

We have not run sufficient yardage to establish a cost figure for metal loss as yet, but indications are that it will be small, and will be offset by the savings in chemicals possible by this process. To minimize metal loss, it is necessary to eliminate all products which will react chemically with the metal. New standards of purity will have to be established for the dyes and chemicals used. With few exceptions, products currently in use meet these standards.

Like the pad-steam method, the Standfast process is basically an impregnation and development process. The results obtained compare closely with those of the pad-

steam method. In both cases, certain shades on certain constructions should be pigment-padded, dried, and then developed through the machine to give satisfactory appearance and penetration. In general, penetration is better than jig dyeing, but not as good as pad-jig, when dyed directly on the machine.

Shades produced on the machine are very good as regards levelness. End-to-end shading has been eliminated without the necessity of establishing an equilibrium in the dyebath. Side-to-side variations are minimized. There are no pad rolls to wear or get out of adjustment, since the squeeze is due to the pressure of the metal on the cloth. This type of squeezing action allows fabrics with very uneven surface construction to be impregnated without the defects common to padding on these constructions. The high-temperature leuco padding has practically eliminated dye specks, a problem which has plagued low-temperature pigment-padding methods.

The fastness properties of the vat dyestuffs applied by this method compare closely with results obtained by older methods. This applies to wash, light, and crock fastness.

We have seen no evidence that the physical properties of the fabric are effected to any greater extent by molten-metal development than by any other process.

I feel that the Standfast process has a definite place in the American production picture. It will be used where the length of runs, and fabric construction make older processes uneconomical and inefficient.

* * * * *

BOND MACHINE

BOYCE C BOND

Pittsburgh Coke & Chemical Company

1) With the Bond machine, cotton, rayon, acetate, high-tenacity rayon, high-tenacity acetate, nylon, Orlon 41, Dacron, wool, worsted, etc can be dyed alone or in blends.

2) Acid, acetate, direct, diazo, vats soluble-type vats, sulfurs, naphthols, as well as pigments, may be applied.

3) Speed of the Bond machine is comparable with other continuous dyeing equipment: that is, from a production standpoint the speeds may be varied from 10 to 120 yards per minute. However, the dyeing actually takes place in the Bond machine in much less time than in any known dyeing equipment; for instance, if one is operating the machine at a speed of 70 yards per minute, the actual dyeing is done in 0.83 second and fixation or oxidation of any vat color is done in 0.83 sec. This time represents the actual time the fabric is in contact with dye liquor or fixing chemicals.

The Bond machine employs an extremely low liquor-volume ratio. The machine may be used for many applications such as desizing, scouring, dyeing, applying mothproofing, mildewproofing, waterproofing, softeners, etc, or, in fact, practically any liquid application to a fabric or any sheet of material. It has been found very advantageous in developing and wet-finishing screen prints composed of soluble-type vats and Rapidogen-type colors.

As low as 50 yards or even a sample may be run, if necessary.

Fabrics processed on the Bond machine are equal to those processed by comparable methods of continuous dyeing insofar as fastness to rubbing, light, washing, perspiration, hot pressing, bleaching, etc.

Fabrics including cotton duck have been run on the Bond machine with satisfactory results for penetration.

Levelness has been found excellent on all classes of fabrics and colors.

Effects on physical properties in the Bond machine have been notably superior as compared with other known types of continuous dye equipment. Distortion and crushing are practically nil on this machine for fabrics in general, including such fabrics as satins, evening-gown noncrush velvet, rayon and acetates, or other pile fabrics, such as plushes, velvets, corduroys, mohair upholstery material, or synthetic upholstery fabric. The machine can be operated practically tensionless. Cotton-pile rugs have been processed with excellent results showing excellent levelness and penetration, as well as fastness properties. The machine is quickly adjustable to all heights of pile for pile fabrics and to different thicknesses of flat goods. There are no such mechanical pressures on the Bond machine as on other known types of continuous dyeing machines, hence the reason that fabrics of any type are not crushed or harmed. The principle involved on the Bond machine is high rate of flow and liquid pressure equalized throughout the fabric and the individual fibers. This affords even and well-penetrated dyeings with maximum gentleness for the various types of fabrics.

The Bond machine is easily and quickly cleaned for the changing of one shade to another. It is also equipped with automatic devices for raising the units from the dye or chemical liquors to facilitate ease of threading in case of a break in a run. If a break occurs it is only a matter of seconds or minutes before the machine can be in operation again.

HIGH-TEMPERATURE DYEING

ROBERT D ROBINSON

Bachmann Uxbridge Worsted Corp

1) Any fibers that can withstand temperatures above the boil can be dyed in high-temperature dyeing equipment. These include wool, cotton, viscose, aralac, cellulose acetate, silk, nylon, unmercerized cotton, goat hair, cashmere, rabbit fur, linen, alpaca, mohair, and the newer synthetics —— Dacron, Orlon, Acrilan, and X-51. Dynel is the only one, to my knowledge, that will not withstand temperatures above the boil. Various blends with wool can be dyed by selectivity of dyes, temperatures and immersion times. Light fastness is a problem where, for instance, acetate dyes are used on Orlon. Except for yellow, the acetate dyes do not meet men's wear fastness. Except for one or two cases, dyeings of blends of Orlon and wool have not been satisfactory when dyed by the copper method. There is no problem in dyeing blends of wool with cotton or rayon, for instance, at high temperatures.

2) By selectivity, about all types of dyes can be employed, such as acids, basics, vats, directs, and acetates. Chromes can be used but require after-chroming in a conventional kettle, because time and not temperature is a factor in this case. As in the case of conventional dyeings, end uses and fastness properties like that of light must be considered. As pointed out in the process, the dye is padded onto the cloth, which enters through seal rolls into the enclosure under pressure, then into the developing bath. In the case of wool, since the temperature is 270°F, dyes are required that are not readily decomposed. Solubility, dispersion and rate of exhaustion are some of the other factors in selectivity of dyes.

It only requires 12 to 60 seconds to dye a fabric at a high temperature, the time of immersion depending upon the fibers being dyed. Woolen and worsted fabrics have been dyed in 12 seconds with acid dyes at 270°F. The rate of production of the Uxbridge machine is about 30 ypm. If we compare this with a conventional kettle, which requires eight hours to dye the same cloth, there is a marked increase in speed. Such a conventional piece dye kettle, holding 10 pieces or 700 yards, would give on a continuous basis a rate of a little under 1½ yards per minute as against 30 yards per minute by high-temperature methods.

Taking into account the dye discarded at the end of a continuous run, which would be about three gallons of concentrated pad liquor, the dye consumption should be equal and, in some cases, less

than by the conventional kettle method. In addition, steam and personnel should be mentioned.

A minimum practical run might be 2000 to 5000 yards.

With this high-temperature machine, the fastness properties of rubbing, light and washing imparted are equal and, in some cases, better than by conventional methods.

The penetration of all fibers dyed by this method is equal to or better than the penetration by usual methods. The higher the temperature, the greater is the diffusion of dye into the fiber. Comparisons of cross-sections of wool dyed with Calcoid Wool Blue B disclosed that a two-hour dyeing at the boil did not show as good penetration or fiber levelness as when dyed for 50 seconds at 290°F.

While levelness——that is, shading of the cloth from side to center or side to side——has been one of our most difficult problems, all indications are that this problem has been overcome. All dyeings now run at a rate of 30 ypm on (say) a worsted gabardine fall within conventional tolerances as far as levelness is concerned.

Dyeings made at correct temperature and time for a given fiber in a fabric shows no detrimental effect. Wool dyed at 270°F, for instance, or filament Orlon at 290°F shows no appreciable loss in physical properties.

III. INDUSTRIAL PRODUCTIONS

THE PAD-STEAM PROCESS

H L WHITTLE, Fairforest Finishing Co

All of my experience on pad-steam dyeing has been on cotton where vat colors are first applied on the cloth in dispersed form by padding. The padded material is then dried (hot-air drier) and is passed next into a chemical pad through a solution of caustic soda and hydrosulfite. The chemical pad is usually run at room temperature. From the chemical pad the goods enter the steam unit, the temperature of the unit ranging from 212 to 220°F. Such a high temperature causes immediate reduction and promotes good penetration. From the unit the cloth is given a rinse, oxidized, washed, soaped (if needed), hot-washed and dried.

My experience has been that the pad-steam method has proven very satisfactory. Light and dark shades can be dyed at a lower cost. A good level dyeing plus good fastness may be obtained. It is important, however, that a constant temperature be maintained on the steam unit. I prefer a temperature of 220°F. By keeping this temperature, you are able to produce a clean, level, uniform dyeing, especially of blues.

Good results may also be obtained with sulfur colors by padding at a high temperature (skipping the drying operation) and passing the damp goods directly into the steam unit at the same temperature (220°F).

The method produces excellent results in color value and wash fastness for both sulfurs and vats. To obtain such results the cloth should first have a good preparation. This, of course, will go a long way toward minimizing side shading and shade variation.

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THE WILLIAMS AND HOT-OIL PROCESSES

WALTER M HOUSCH, Springs Cotton Mills

Most of my experience has been confined to the vat dyeing of cotton fabrics in Williams Units. There have been many arguments relative to the Williams Unit versus the pad-steam method of dyeing. Each process or method has some particular advantage, and probably the type of cloth and shade being dyed should determine which is the best method to use. The Williams Unit tends to give more leveling action because of the water phase and will best cover unevenly prepared goods. Perhaps this method is the most effective for the widest variety of fabrics.

Until the introduction of the hot-oil method, the pad-steam method was best for the dyeing of very heavy shades. More color value was obtained and better control of shading was shown. This was offset to some degree with hot oil, which allowed the initial reduction to be carried out at a low temperature followed by a passage into the hot oil for the final high-temperature reduction. This method has enabled the dyer to run shades on the Williams Unit which previously were difficult to run as far as control and depth of shade were concerned.

The hot-oil method has some disadvantages. The cost of the oil and materials used for its removal from the cloth adds to the final cost per yard. After long runs on a shade the machine is more difficult to clean. From very heavy fabrics, such as twills, the oil is more difficult to remove.

Since the introduction of instruments for the measurement of reduction potential, a number of shades on which the hot-oil method was used have been changed back to the high-temperature reduction in two Williams Units. More satisfactory results have been obtained with respect to appearance of the goods and fastness properties.

"THE APPLICATION OF VAT DYES"

Dr H C Chapin, National Secretary
American Association of Textile Chemists and Colorists
P O Box 28, Lowell, Massachusetts

Enclosed is my check for $..... covering payment of ..... copies of "The Application of Vat Dyes" at $5.00 per copy.

Enclosed is my check for $..... covering payment of ..... copies of "The Application of Vat Dyes" at $6.00 per copy.

Name ..... Address .....

See description in June 8th issue.
Prices: $5.00 to members
$6.00 to nonmembers

Personnel Service at Chicago Convention

FOR the purpose of introducing members to employers, Personnel Service will operate, without charge, from Thursday afternoon, September 17, through Saturday morning, September 19th at the Chicago Convention in The Conrad Hilton. Members seeking employment should, if possible, register before the Convention but members, as well as employers, may register at the Convention.

Every member expecting to use this Service in seeking employment is requested to write in advance to H C Chapin, Secretary, AATCC, Box 28, Lowell, Massachusetts, for two blanks on which to state his qualifications and desires. For attachment to these, two photographs measuring about 2 x 2½ inches are desirable.

Employers registering with the Service at the Convention will be permitted to consult these records, and will be assisted in arranging interviews between 2:00 P M and 5:00 P M on Thursday; between 9:00 A M and Noon and 1:00 P M to 5 P M on Friday; and between 9:00 A M and Noon on Saturday. Representatives of educational institutions also are invited to register for the purpose of answering inquiries about their students.

300 Attend Piedmont Section Outing

THREE HUNDRED members and guests enjoyed a diversified program at the Annual Summer Outing of the Piedmont Section, held June 12th and 13th at the Mayview Manor, Blowing Rock, N C.

In the feature event on Saturday, Gordon Eaves, Cloverdale Dye Works, took low gross honors in the golf tournament with a 69. Other golf winners included:

1st Blind Bogie (net 76)—R E Rupp, J C Brooks, W Beaumont, S Young and J W Ivey.

2nd Blind Bogie (net 79)—E Holt, J Boesch, R P Timmerman, S Y Stribling III, J Kellett, Jr, H Dohner, C F Embody, R B Graham, Jr and P Gilchrist.

Ladies Tournament—P Rendleman, M Powell, C Gaede and L Hurd.

Other events including shuffleboard were held on Saturday for those not participating in golf.

A luncheon was held for the ladies on Saturday noon, at which time special prizes were awarded.

A cocktail party preceded the regular Saturday evening banquet and awarding of prizes to winners of the days' events. Dancing, following the banquet, concluded the two-day affair.

NEWS

• 34 Technical Sessions Feature of ASTM Meeting

The 1953 meeting of the American Society of Testing Materials, held during the week of June 28 at Atlantic City, was featured by 34 technical sessions at which were presented 131 technical papers. A total of 2472 attended the meeting.

Seventy-two of the Society's technical committees reported at the meeting, with the result that 63 new specifications and tests were approved and revisions in 185 existing tentatives and standards were acted on. A total of 62 specifications and tests that have been published previously as tentatives were approved for reference to Society letter ballot for adoption as standard. All of these new and revised standards will be published later in the year in the 1953 Supplement to the Book of ASTM Standards.

Including the 1953 Annual Meeting actions there are now about 1965 ASTM Standards. This compares with the figure twenty years ago of 690 and ten years ago, 1943, of about 1200. These figures indicate a definitely increased tempo in standardization activities during the last decade.

The meetings of main technical committees and their subcommittees, totaling 565, were in progress from Sunday, June 28 through Friday, July 3. At times there were as many as 52 meetings running simultaneously. It was estimated that at the 1952 meeting there were about 450 meetings of committees.

• Refined Products Names New England Representative

Appointment of American Chemical & Solvents Co, of Providence, R I, as New England Sales Representative for Refined Products Corporation, Lyndhurst, New Jersey, was announced recently by Ralph Zoccolillo, president of Refined Products. This is another step in the company's sales expansion program to better serve the textile and industrial chemical markets in New England.

American Chemical & Solvents was founded by Henry A De Wolf, in 1945 to supply the specific needs of the textile, paper and metal trades in the New England area. Mr De Wolf has been associated with these industries for over 25 years.

Refined Products Corporation manufactures detergents, wetting agents, softeners, gas-fading inhibitors, sequestering agents, textile resins, water repellents, quaternaries, and other related materials.

• New Sales Headquarters

New headquarters for two members of the Du Pont Company's Chicago sales office of the Dyes and Chemicals Division were announced by the company recently. A C Sutherland will be located in Appleton, Wis, and B F Vaughan in Kalamazoo, Mich.

Both Mr Sutherland and Mr Vaughan have worked out of Chicago for a number of years. This new move was designed to bring them closer to their customers, principally in the paper and textile industries.

• Chemical Club Baseball Party

Approximately 370 members and guests of the Chemical Club of New England attended the 5th annual baseball party Wednesday, July 29th, watching their favorite Red Sox lose to Chicago. Managers of both baseball clubs later attended the dinner at the Somerset Hotel in Boston and presented talks on various phases of the afternoon game and related incidents from their baseball careers. Edward C Richardson, president of the Chemical Club, acted as master of ceremonies during the evening.

• Sill Industries To Represent Carbomatic

Carbomatic Corporation, Freeport, N Y, has appointed Sill Industries, Maplewood, N J, as sales representatives and distributors for its complete line of gas-fired heating equipment.

As a result of this appointment Sill Industries adds a line of gas processing heaters to the line of electric radiant heating panels which Sill has been marketing for industrial processing operations over a period of some five years. Whereas the Carbomatic units in the past have been sold largely to the textile industry and were spearheaded by the Carbomatic infra-red singeing unit, Sill plans to broaden the scope of application due to the new burner types now available.

The principal equipment to be featured in the coming months are the Carbomatic Una-Ray and the Carbomatic Pyro-Jet units.

• Consolidate Boston Branches

United States Testing Company has announced the consolidation of its two Boston branches. Effective July 17 the Boston Wool and Textile laboratory and the Boston Research Division have been combined in larger quarters at 288 A Street. Manager of the Boston branch, R T McAndrew, will continue in charge of the combined functions with R G Shepherd, Jr supervising research and R F Weldon as district sales manager.

OBITUARY

BENJAMIN RILEY, JR

BENJAMIN RILEY, JR, president and a member of the board of directors of John D Lewis, Inc, Providence, R I since 1945, died at his home on July 25th.

MALCOLM P COULMAN

MALCOLM P COULMAN, 31, sales representative for Onyx Oil & Chemical Co for Western New England and upstate New York, died on July 17th at Newburgh, N Y from burns suffered in an accident on June 16.

Mr Coulman was graduated from Lowell Textile Institute in 1943 and served with the Army Air Forces as a B-17 pilot during World War II. He was held as a prisoner of war for 11 months after being shot down over Yugoslavia.

Prior to joining Onyx in 1949, Mr Coulman had been with American Aniline Products, Inc, and later, the Hat Corporation of America.

He was a member of the Western New England Section, AATCC.

Mr Coulman is survived by his widow and three children.

NAMES IN THE NEWS

J L Naylor

JAMES L NAYLOR, former assistant manager of the Dyestuff Department, Calco Chemical Division, American Cyanamid Company, has been named manager of the Department, succeeding J PFISTER, who will give his time to Calco's New England business and be available for special assignments.

Mr Naylor was associated with the textile manufacturing industry for several years prior to joining Calco's dyestuff sales organization in 1929. He was appointed manager of the Providence office in 1938, holding that position until 1945, when he was made assistant manager of the Dyestuff Department.

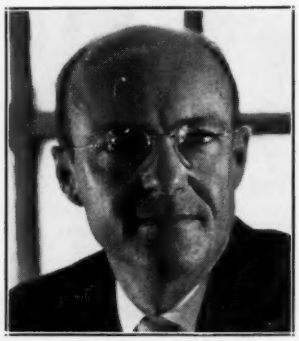
Other news from Calco concerns the appointment of MILTON H METTEE, III as Branch Manager Metropolitan Sales District. Mr Mettee succeeds PAUL J LUCK, who recently resigned from the post after 23 years with Calco. Mr Luck, Chairman of the New York Section, AATCC from 1950 to 1952 and Co-chairman of AATCC's National Convention in 1951, has not announced his future plans. Mr Mettee has been assigned to the Metropolitan Sales District since 1946 as senior sales representative to the plastic industry.

The appointment of ALFRED L PEIKER as director of the Development Division highlights the news from Cyanamid's Stamford Research Laboratories. Dr Peiker, who was most recently manager of textile resin research at the Calco Chemical Division's Bound Brook, N J, plant, replaces L P MOORE, recently named assistant general manager of the Plastics and Resins Division.

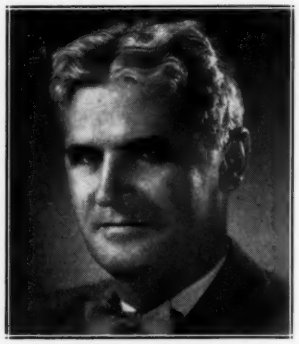
GEORGE H HOTTE has been appointed manager, Synthetic Fiber Sales, National Aniline Division, Allied Chemical & Dye Corporation, where he will be responsible for marketing and application service in connection with the new man-made fibers to be produced by National Aniline in the $25 million plant now under construction at Hopewell, Virginia. He will report directly to H J DAIGNEAULT, Vice-President, National Aniline Division and will make his headquarters at the Company's Executive Offices at 40 Rector Street, New York.

Mr Hotte was previously technical director, A M Tenney Associates, Inc, New York and was for many years associated with Wellington Sears, Fine Goods Division and with the Firestone Tire and Rubber Company.

Mr Hotte will assume his new duties on September 1.



M H Mettee, III



A L Peiker

G H Hotte

P J Luck

RAYMOND J TRIMPERT has been named director of research of the Frank H Lee Company of Danbury, Conn, one of the nation's leading manufacturers of men's hats, and LEONARD S LITTLE, a textile consultant, has been appointed associate director in charge of textiles and fibers. HAROLD H TUCKER, research consultant will serve the Company in that capacity on dyeing and processing.

Mr Trimpert, since 1943 the firm's chief chemist, developed Lee's nonmercuric carrot, an essential in hat-making, and has done considerable work in the development and introduction of new and improved methods of carrotting. He has also worked on the creation and introduction of new fibers for felting hats and on Lee's pioneering of the Aridex water-repellency treatment for fur, felt and straw hats.

Mr Little, who in January, 1951, retired from Du Pont, continues to conduct his own textile consulting firm at 101 West 31st St, New York.

All three are members of AATCC, Mr Little currently serving as Chairman of the Executive Committee on Research.

CARL PULLER, Pfister Chemical Works, Ridgefield, N J, expects to return from Europe early in September, after spending two months on the Continent. This trip includes visits to several dyehouses, print shops and chemical plants in Germany and Switzerland.

Mr Puller left for Europe July 3rd on the liner America.

HAROLD E HUBER has been promoted to the Technical Sales Department Votator Division, The Girdler Company, Louisville, Ky. Prior to being elevated to his present position, he was chief process engineer of the Votator Division.

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